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Psychology

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Library of Congress Cataloging in Publication Data

LIEBERT, ROBERT M.
Developmental psychology.

Bibliography: p. 521
Includes indexes.
1. Developmental psychology. I. Poulos, Rita Wicks, (date) joint author. II. Marmor, Gloria Strauss, (date) joint author. III. Title.
BF713.L53 1977 155.2 76-46316
ISBN 0-13-208231-4

S.C.E.R.T., West Bengal
Date 8..3..78.......
Acc. No.2637..........

136.5
LIE

Bureau Edn. [illegible] Research
Dated 8.3.78
Accs. No 2637

DEVELOPMENTAL PSYCHOLOGY, *2nd Edition*
ROBERT M. LIEBERT, RITA WICKS POULOS, AND GLORIA STRAUSS MARMOR

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Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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PRENTICE-HALL OF SOUTHEAST ASIA PTE. LTD., *Singapore*
WHITEHALL BOOKS LIMITED, WELLINGTON, *New Zealand*

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Preface

As in the first edition, our aim in the second edition of *Developmental Psychology* is to present a broad but selective survey of what is known about human development, We continue to believe in the singular importance of identifying meaningful continuities and understanding the processes that underlie them, and this belief is again reflected throughout the book. Those familiar with the first edition will also notice our continuing effort to point out and explain the pertinence of developmental psychology to practical human concerns; in this edition, we have presented extended discussions on such topics as the effects of television on social development, the "battered child syndrome," applications of behavior modification, and cultural bias in testing, as well as a number of others.

We still view the idea of weaving significant "readings" into a text such as this as a good one, but reprinted professional articles often seem overwhelmingly complicated to those not familiar with them. In this edition, we have been fortunate in having a number of prominent experts write descriptions of their work especially for this book; the Selections by Peter Ornstein (on memory development in children), Thomas Lickona (on moral development), and Francis Palmer and Thelma Semlear (on early intervention as compensatory education) were contributed in this way. Our remaining Selections, which cover topics literally ranging from the crib to the grave, are reprinted in abridged form from the professional journals and monographs. These "readings" are considerably shorter than those in the first edition, and each has been selected for its intrinsic interest, clarity of style, and significance.

Several other major changes have also been made. This edition has a decidedly more cognitive emphasis than the first, reflecting the many advances in cognitive psychology over the past few years. Major revisions in the chapters on cognitive development, perceptual development, and language reflect this shift in emphasis, as do all of the chapters on social development. This does not mean we have abandoned the strong social learning theme that characterized the first edition; rather, we have viewed the child's social learning as a complex interactive process that involves intellectual, affective, and cultural factors as well as those identified by narrower learning approaches to development. In the same vein, this edition is more attentive than its predecessor to anthropological, cross-cultural, and longitudinal studies. New material has also been added on sex differences and sex roles, reflecting a tremendous spurt of interest in these topics within the field. In addition, we have made a systematic effort to avoid a masculine gender bias in our descriptions.

We received valuable assistance from Neale Sweet, Shirley Stone, Walter Behnke, and Jeanne Hoeting of Prentice-Hall, from the thoughtful reviewers whom we have acknowledged elsewhere and, of course, from the many students who have shared with us their reactions to the first edition and to the revision as it evolved.

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Acknowledgment

We are greatly indebted to those who reviewed the manuscript during its preparation; without their thoughtful input this book would be less complete, less accurate, and less interesting. Responsibility for any problems that remain rests solely with the authors.

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Developmental Psychology

Some Developmental Viewpoints

CHAPTER 1

OUTLINE

HISTORICAL BACKGROUND
THE CONCEPT OF DEVELOPMENT
  Chronological versus Functional Analysis
  Biological versus Environmental Determinants of Behavior
  Continuity versus Discontinuity in Development
  Behavioral versus Cognitive Emphasis
THE ROLE OF THEORY
  Maturational Theory
  Psychoanalytic Theory
  Social Learning Theory
  Present trends
  Selection 1—The Impact of Theories of Child Development
THE CENTRAL IMPORTANCE OF METHOD AND RESEARCH EVIDENCE
SUMMARY

From the moment we are conceived, each of us is changing continuously because of the interplay of certain biological processes and the input and experience provided by our environments. The physical changes are easy to see, as when the almost helpless human baby is transformed into a vigorous toddler, a strapping child, an active adolescent, and then a full-grown adult, following a sequence that is characteristic of every human being. Other developments, more difficult to describe or explain, also go on continuously. The infant's rudimentary ability to solve problems and communicate with others, for example, gives way within a few short years to sophisticated language and intellectual skills that differentiate our species from all other forms of animal life. With changes in physical and mental maturity come a host of gradual changes in social behavior and emotional experiences. The child who used to blush in social situations, commit various faux pas, and struggle openly with feelings of fear, anger, and love often becomes a socially skilled, poised adult with a unique and complex personality that may amaze even those who have seen the transformation take place.

Developmental psychology is that branch of psychology that studies these changes and, in fact, all the changes in physical, mental, and social functioning that occur throughout the life span, from conception to death. One reason for studying these changes is that they are interesting in their own right; students as well as professional investigators who study the basic processes of development are often able to satisfy part of the universal curiosity that people have about themselves and their surroundings. But the study of human development holds out more than the opportunity to study the intriguing and the unknown. Our growing understanding of children's development, for example, has already provided us with valuable information about the basic psychological processes involved in perception, thought, learning, and socialization. This permits not only a better understanding of children but also a better grasp of adolescent and adult behavior. Through an understanding of basic processes, we can hope to learn how development may go awry and to create treatment programs that will remedy deficiencies or prevent the occurrence of similar difficulties for other children and adults. There is also the other side of the coin. Some individuals seem to develop especially well, displaying unusual levels of success, competence, and interpersonal sensitivity in adulthood. Understanding how *they* got that way can be socially useful in guiding child-rearing practices.

In this book we present a general introduction to the study of human psychological development. There is, though, such an abundance of findings and viewpoints that complete coverage of the relevant literature would result in a truly encyclopedic presentation. Our approach, instead, has been to emphasize those processes and problems that are most central to contemporary developmental psychology and most likely to be of interest to the reader.

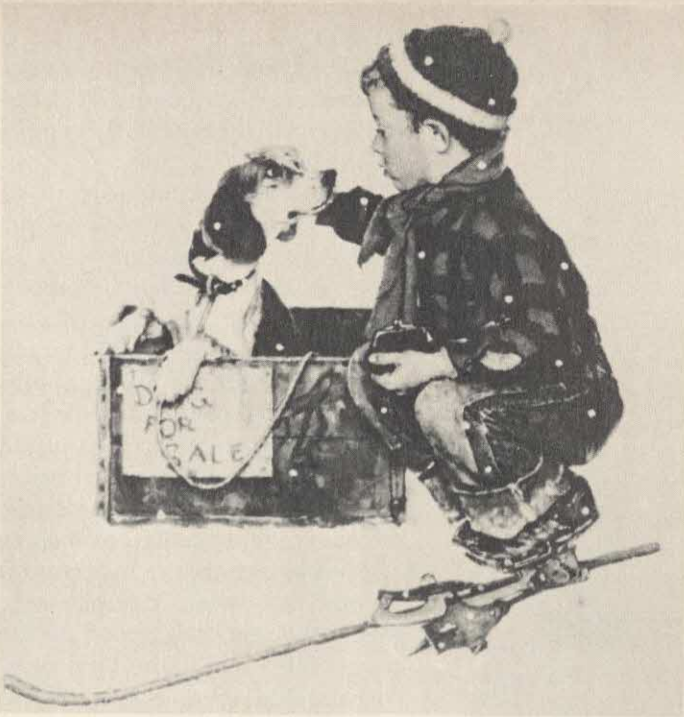
In addition to our basic presentation, designed to provide an initial look at the field, the pages that follow contain two specific elements that will permit a more detailed exploration of some major issues. First, several brief Selections by prominent developmental psychologists have been included to broaden our coverage and provide direct exposure to the language and thinking found in the professional literature. Some of the Selections have been written especially for this book, by experts kind enough to lend their knowledge and insights to our endeavor; other selections, reprinted from the existing literature, have been chosen because they are classics that continue to have contemporary importance. Second, a number of topics are examined in relatively greater detail within the text itself, set off as Extended Discussions so that our readers may obtain an in-depth familiarity with the facts, methods, and disputes surrounding these issues of scientific and social importance. Before proceeding, however, we must say a word about our subject matter and about the various theories and research methods that have characterized the study of human behavior.

HISTORICAL BACKGROUND

Most of our present views about psychological development are relatively recent innovations. Medieval writers thought of the child as an "ill-formed adult at the edges of society" (Kessen, 1965), a notion that is reflected in the art of this period. (See Figure 1–1.) According to one analysis of medieval society:

> . . . the idea of childhood did not exist; this is not to suggest that children were neglected, forsaken, or despised. The idea of childhood is not to be confused with affection for children: it corresponds to an awareness of the particular nature of childhood, that particular nature which distinguishes the child from the adult, even the young adult. In medieval society this awareness was lacking. That is why, as soon as the child could live without the constant solicitude of his mother, his nanny, or his cradle-rocker, he belonged to adult society. [Ariès, 1962, p. 128]

Born in seventeenth- and eighteenth-century philosophy, the idea of childhood as a special period, in which youngsters were seen to have unique psychological, educational, and physical needs, came to hold



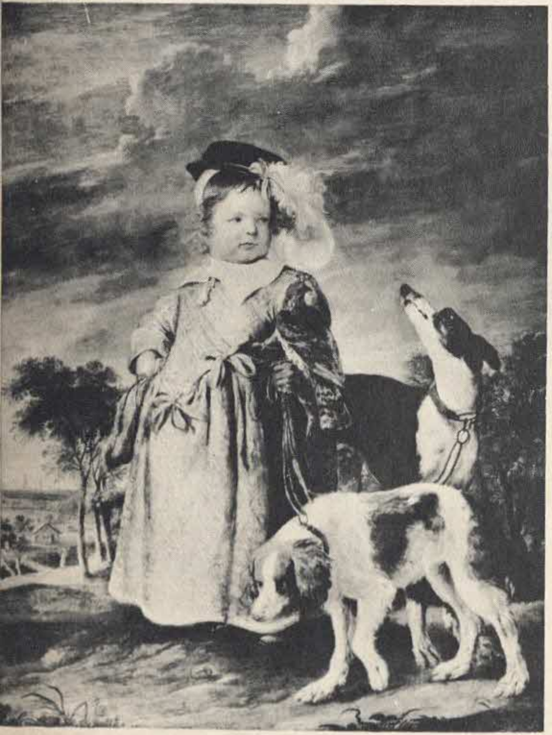


FIGURE 1-1

Erasmus Quellin's "Portrait of a Boy with a Dog" (left), painted in the seventeenth century, shows that little distinction was made between childhood and adulthood, for the child is depicted simply as a miniature adult. From the Museum of Fine Arts, Antwerp. SCALA New York/Florence.

Norman Rockwell's "Boy with Dog" (top), painted in 1958, clearly captures the special mood of childhood that only emerged more recently. Rockwell illustration reproduced by permission of and copyrighted by Brown & Bigelow, St. Paul, Minnesota. Courtesy Mr. M.W. Eichers.

sway. Philippe Ariès writes of the times: ". . . fondness for childhood and its special nature no longer found expression in amusement and coddling, but in psychological interest and moral solicitude. The child was no longer regarded as amusing or agreeable, but as in need of help and guidance. [It was realized that] in order to correct the behavior of children people must first understand them" (1962, p. 133). At first it was hoped that philosophy would provide this understanding, but by the middle of the nineteenth century a new approach to understanding childhood had emerged: abstract speculation about the child's "nature" was replaced by empirical efforts to record and study the behavior and development of the young. This was the dawn of contemporary developmental psychology. The impetus for the new science came from many sources, but evolutionary biology and its founder, Charles Darwin, played a unique role:

> . . . with the publication of Darwin's *Descent of man*, in 1871, the child became a unique part of the scientific endeavor. . . . For nearly half a century after Darwin's shattering of the mirror, the child became the best natural laboratory for the study of evolution, and the idea of *development* dominated the science of man [Later workers] built child psychology with Darwin's bricks. [Kessen, 1965, p. 6]

To illustrate the marriage of evolutionary theory and developmental theory, we can turn to Darwin's diary of his own infant son—kept for the purpose of observing the "natural development of the lad and comparing it with what was known of the development of other animal species." Here is one of Darwin's early observations:

> When nearly four months old, and perhaps much earlier, there could be no doubt, from the manner in which the blood gushed into his whole face and scalp, that he easily got into a violent passion. . . . When eleven months old, if a wrong plaything was given him, he would push it away and beat it; I presume that the beating was an instinctive sign of anger, like the snapping of the jaws by a young crocodile just out of the egg, and not that he imagined he could hurt the plaything. . . . [Quoted in Kessen, 1965, p. 121]

Darwin did much to generate the nineteenth century's pervasive interest in development of all sorts, but developmental psychology had a founder more uniquely its own. G. Stanley Hall shared Darwin's general viewpoint, but he focused it in a particular way. Hall devised objective methods as a substitute for casual observation and studied groups of children over an appreciable age range. As a psychologist, he soon turned to children for the study of such traditional topics as perception, memory, and learning. Meanwhile, Alfred Binet had begun to distinguish between intellectually normal and subnormal children in France, and Sigmund Freud had startled the world with his suggestion that the experiences of early childhood seemed to account for unusual patterns of behavior in adulthood. There was clearly much to be learned and expansion was in order.

By the 1920s developmental psychology had come into the public eye as the bearer of solutions to practical problems. John Watson, the father of behaviorism, had begun to write and lecture on psychology and child-rearing practices. His impact, along with that of Freud, Binet, Hall, and many others, was felt in the emergence of clinics established for the purpose of assessing children and advising parents. In turn, this interest led to an enormous research investment in child development. Short-term studies were set up in numerous university-based nursery schools, and long-range (or *longitudinal*) projects were established at such places as Berkeley and Yale in the United States and in several principal European cities. Many significant contributions which contemporary developmental psychology has inherited from these pioneering efforts appear throughout this book.

But the descriptive information that these trends produced was not alluring enough to continue attracting researchers. While the field of psychology as a whole continued to grow, developmental research waned sharply. In 1938 approximately five hundred publications concerned with children's development appeared; in 1949 that number had shrunk in half (Stevenson, 1968).

Then, at the beginning of the 1950s, developmental psychology was revitalized. Many factors—a prospering economy and the research funds that came with it, a large new generation of youngsters, the establishment of various government agencies—contributed to this rise, but chief among them was the fact that developmental psychologists had adopted a new approach to their subject. No longer concerned primarily with description for its own sake, their interest had turned to a concern with the processes that underlie the development of behavior.

THE CONCEPT OF DEVELOPMENT

Development refers to a process of change in growth and capability over time, as a function of both maturation and interaction with the environment. Harold Stevenson, a prominent developmental psychologist, has put it this way:

> Developmental psychology is concerned with the study of changes in behavior throughout the life span. Although, logically, equal emphasis should be placed on development during all stages of life, so far most research has dealt primarily with infants, children, and adolescents. Because of this emphasis the term "developmental psychology" is often used interchangeably with the older terms "child psychology," [and] "adolescent psychology." . . . Underlying all the terms, however, *is a concern with the emergence of behavior in the human being.* [Stevenson, 1968, p. 136, italics added.]

Using Stevenson's broad definition, our discussion will be guided by more precise guidelines derived from the theoretical disputes, problem areas, and research questions that have influenced developmental psychologists. As with any area of study, the concept of development is defined in part by these dimensions. Thus the brief list of issues considered below serves to introduce a number of interrelated themes which will recur regularly throughout this book.

CHRONOLOGICAL VERSUS FUNCTIONAL ANALYSIS

One possible way to explore development is through a simple chronology. We might attempt to describe the child as completely as possible during its intrauterine existence (i.e., in the womb of its mother before birth), proceed to a similarly detailed description of the first weeks or months of life, then on to early childhood, middle childhood, and so on. Studying changes in behavior over time often provides a valuable descriptive account of the progress of development. Chronological data also have an important, practical value, for they provide norms against which individuals can be measured. When we say, for example, that a particular child is retarded or precocious, a comparison with other children is always implied. It is from chronological studies that information as to what constitutes a "normal" rate and course of development is derived.

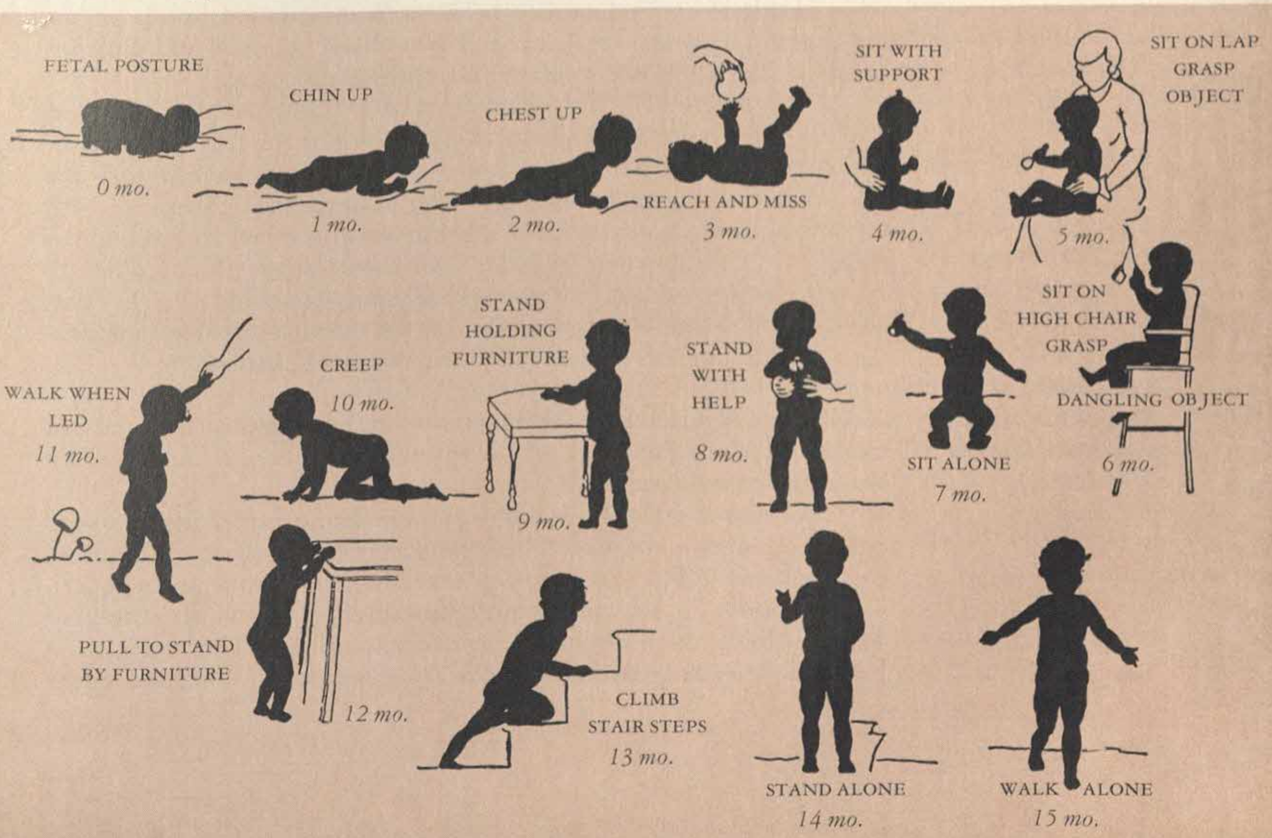
The value of such descriptive chronological data is illustrated in Figure 1–2, which pictures the growth of early motor development disclosed by Mary Shirley's (1933) observation of twenty-five children. Information of the sort presented in this illustration may be useful to parents, physicians, and psychologists in determining whether a child's progress is sufficiently unusual to warrant further diagnosis or perhaps even special treatment.*

---

*Of course, caution must be exercised lest one become unnecessarily concerned about minor individual differences between a given child and the norms. A parent may be justifiably concerned if his or her child cannot walk alone at thirty months of age, but concern would not be appropriate if the child is only one or two months "behind" the published averages.

FIGURE 1–2

The sequence of motor development during the first fifteen months of life, illustrating the utility of a chronological approach for providing normative information. Adapted from M.M. Shirley, *The First Two Years: A Study of Twenty-Five Babies*, Vol. II. University of Minnesota Press, Minneapolis. © 1933, University of Minnesota, by permission.


FETAL POSTURE
0 mo.
CHIN UP
1 mo.
CHEST UP
2 mo.
REACH AND MISS
3 mo.
SIT WITH SUPPORT
4 mo.
SIT ON LAP GRASP OBJECT
5 mo.
SIT ON HIGH CHAIR GRASP DANGLING OBJECT
6 mo.
SIT ALONE
7 mo.
STAND WITH HELP
8 mo.
STAND HOLDING FURNITURE
9 mo.
CREEP
10 mo.
WALK WHEN LED
11 mo.
PULL TO STAND BY FURNITURE
12 mo.
CLIMB STAIR STEPS
13 mo.
STAND ALONE
14 mo.
WALK ALONE
15 mo.

Although a chronological strategy seems to be ideal for observing and exploring development, it has a number of limitations. In the first place, a chronological account may lead us to overlook basic processes underlying development. We must not, in other words, forget that developmental changes occur *over* time, but none occur merely *because* of time. Then, too, many factors in development are largely independent of time and the child's age. Hereditary determinants of behavior, for example, may run the entire gamut of the individual's life, and it is helpful to inspect them in this context. Similarly, questions that at first appear to be chronological (How does a child's willingness to share with others change as he or she grows older?) may be best answered in terms of learning processes which operate at all ages. Thus, although we shall have a number of occasions to focus upon chronological trends in development as the child grows, the major orientation of this book is toward analyzing the processes that underlie change rather than toward describing the changes themselves. This approach is what is meant by functional analysis.

BIOLOGICAL VERSUS ENVIRONMENTAL DETERMINANTS OF BEHAVIOR

Of all the issues and disputes that appear in the study of development, perhaps none has been as pervasive as the debate regarding the relative contributions of biological and environmental influences to behavior. The problem has been discussed as the *heredity-environment* issue, the *nature-nurture* controversy, and by many other names. Although the question underlying this dichotomy appears to be quite simple (i.e., How much of the individual's behavior is contributed by his or her biological and genetic makeup and how much by social and environmental influences?), the apparent simplicity is deceptive.

As Anastasi (1958) has noted in a careful analysis, the questions "Which one?" and "How much?" simply overlook the fact that an individual's hereditary endowment and the environment to which he or she is exposed must *interact* in order to produce behavior. Because both heredity and environment make an absolutely necessary contribution to behavior, questions that presume that these factors simply differ in quantity or importance, like two bank accounts, are not likely to be fruitful. Instead, we ultimately must ask *how* (i.e., in what manner) biological and social influences combine for various kinds of behavior.

CONTINUITY VERSUS DISCONTINUITY IN DEVELOPMENT

Two types of behavioral change often are identified in the study of human development, those that are gradual or *continuous* and those that are sudden or *discontinuous*.

To understand the nature of this distinction, consider the following example suggested by the work of Jean Piaget (whose theory of cognitive development will be discussed in detail in a later chapter). An experimenter begins by showing a four-year-old child two short, wide glass beakers, each containing the same quantity of milk. The youngster is asked whether both beakers have an equal amount of fluid, and agrees that they do. Then, while the child watches, the experimenter pours the entire contents of one of these beakers into a third beaker—a tall, thin one. When the child is asked to compare the two beakers that now contain milk, he or she often will say that the tall, thin beaker has more milk in it than the original short, wide one. In contrast, older children, like adults, will immediately point out that the two beakers in question must have the same amount of milk, for the volume of the two original beakers was equal at the beginning and no liquid was lost or gained by merely pouring the contents of one of them into a container of a different shape.

How and why does this transition in handling the problem occur? Is there a qualitative change or *discontinuity* from one mode of thinking to another as the child grows older, or would the change, if we were able to watch it more closely, appear to be a gradual, *continuous* process of growing sophistication? The former viewpoint leads to the suggestion that development proceeds in a series of relatively discrete *stages;* it thus compels the theorist to try to identify these stages and analyze their components. As we shall see, this is the conclusion that, with some qualifications, Piaget has reached in examining the child's intellectual development. Likewise, other stage theorists have argued that many aspects of human emotional and social development proceed in a relatively discontinuous, stagewise fashion.

Other theorists, though, have emphasized the possibility that development may only seem discontinuous. Observers who compare children of different ages may be unable to detect gradual changes as they occur, and thus may mistakenly take large or dramatic shifts as evidence of discontinuity. Even if the same children are observed over time, the frequency and nature of the observations can play an important role in determining whether developmental changes will seem gradual or relatively abrupt.

The continuity-discontinuity issue involves much more than measurement. Major questions revolve around the processes through which change occurs. Stage theorists often insist that universal, biologically based factors play a prominent role in development. Relatively uniform structural changes, they argue, occur in the psychological processes of almost all children and give rise to relatively discontinuous changes in behavior.

In contrast, theorists who emphasize continuities often assume that social and experiential factors underlie many developmental changes. Children, they point out, must *learn* to behave as they do; the learning is likely to be a gradual, continuous process that will vary from one child to another depending upon individual differences in socioeconomic, ethnic, and cultural background, as well as other factors.

Although it should be emphasized that all theorists agree that there are both continuities and discontinuities in development, differences in emphasis and vantage point are of sufficient importance to have implications for almost every substantive topic raised in this book.

BEHAVIORAL VERSUS COGNITIVE EMPHASIS

Psychology emerged as an independent science in the late nineteenth century and was at first devoted exclusively to understanding the nature of thought and the structure of the human mind. The early psychologists were interested in *cognitive processes* (such as perceiving, knowing, and expecting), and it seemed to them that these processes could be studied only through asking trained subjects to examine their own mental processes—to introspect. As a scientific tool, the method of introspection just didn't work; there was no way to settle disputes when two investigators disagreed. Psychologists searched for the objectivity of science, and a vigorous young psychologist named John Watson attracted a great deal of interest by saying that psychology should not be concerned with cognitive processes at all; rather, it should adopt a behaviorist stance. According to Watson:

> Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. [Watson, 1913, p. 158]

FIGURE 1–3
John B. Watson, father of modern behaviorism. Culver Pictures.

During the early part of this century many psychologists joined Watson in adopting a behaviorist stance, and experimental psychology prospered as a result. But Watson certainly erred in equating the study of cognitive processes with the method of introspection. To find out how children think when they solve problems, one need not ask them to analyze the workings of their own minds. European psychologists such as Jean Piaget were the first to see that more objective methods could be applied to the study of mental processes. As illustrated in his previously mentioned work on children's perception of liquid quantity, Piaget showed that mental processes might be inferred from a child's overt behavior. Piaget's inferences led to further predictions which were tested and confirmed objectively, and the excitement caused by his work and that of a number of other modern cognitive psychologists has made the strictly behavioral stance seem shallow to many developmentalists. Strict behaviorism still thrives in some quarters, however; and modern behaviorists believe they can understand all the phenomena studied by cognitively oriented psychologists (perceptual, intellectual, and language development, for example) without resorting to a discussion of mental processes.

As with the other issues discussed in this section, the distinction between behaviorist and cognitive approaches has become more one of relative emphasis than outright antagonism in the past few years, but the fundamental question of the role of internal mental processes in psychological development remains quite important.

THE ROLE OF THEORY

Even in our brief discussion thus far, it has been impossible to avoid the word "theory." What functions do theories serve in the investigation of development? The answers are many.

Theories always serve an explanatory-descriptive role, providing a basis for organizing and condensing facts that are already known. They also should enable us to predict future events. To do so, a theory must be *testable* and thus potentially *capable of being refuted* or falsified. It must lead to the derivation of specific hypotheses or predictions which can be confirmed or disconfirmed publicly. Related to this predictive function is the manner in which theories guide research into areas that might not otherwise attract interest or that might otherwise seem too complicated to be handled. Like a prospector's map of secret treasure, they lead us to expect substantial yields in areas that would otherwise seem to have little promise.

On the other hand, theories also may turn research away from phenomena that, from the standpoint of other theories, are generally believed to be critical. For example, it is widely held that a child's early toilet-training experiences play a vital role in later social development. However, several learning theory approaches to behavior suggest that these early experiences have little or no important bearing on, say, the behavior of an adolescent. Adherents to the latter view will be guided by their theory to *not* seek, and perhaps eschew, information about lavatory practices in early childhood which might otherwise occupy their research or clinical efforts.

Although a number of significant developmental studies have been done without the impetus of a full-blown theory, some theoretical notions or coherent hunches about how the processes of development must work are always present. More important, though, is that modern developmental research has for the most part been guided by theory. Anyone who has contact with children will develop her or his own unique view of development, and as someone has quipped, parents are just developmental psychologists who do not publish. But three broad formal theories have strongly influenced those who do publish, and each theory merits a brief introduction here.

MATURATIONAL THEORY

A scholarly analysis of the impact of theories of child development (Caldwell and Richmond, 1962) refers to "maturational theory" as one of the three major theories that have guided developmental psychology. The basic idea behind this theory is that most of the changes we see in children over time occur because of a specific and prearranged scheme or plan within the body. Maturation, according to this view, reveals the natural unfolding of the plan, and patterns of growth charted over time are like the trail of a skywriting plane which shows us only that part of the mission that is already completed.

The view that all development, from infant nursing patterns to the emergence of moral values, is self-regulated by the unfolding of natural processes and biological plans was popularized by Arnold Gesell (1940, 1956). Gesell himself studied primarily children's physical and motor development, work that generated major interest but only minor controversy. Then, as now, almost everyone was willing to agree that, say, rate of growth is heavily influenced by a simple process of matura-

FIGURE 1–4
Arnold Gesell, prominent maturational theorist, testifies before a Senate subcommittee concerned with mounting juvenile delinquency, December 1943. Wide World Photos.

FIGURE 1–5
Sigmund Freud (center) in London in June 1938 after being rescued from Nazi-occupied Vienna. With him are his daughter Mathilda and Dr. Ernest Jones, one of his firmest disciples and his biographer. Wide World Photos.

tion. But the maturational view of intellectual and personality development—that is, of complex social behavior—continues to be vigorously attacked and defended. We will therefore have many occasions to mention it later.

PSYCHOANALYTIC THEORY

Psychoanalytic theory, the theory developed by Sigmund Freud, ranks among the most far-reaching and influential views in modern history. Freud too was convinced that the structure of human personality is intrinsic, and that people mature psychologically according to principles that apply universally. But he was also convinced that the functional aspects of each individual personality are shaped by experience in a social context.

Freud's great message to developmentalists was his insistence on the importance of early experience for laying down patterns that will then endure through the entire life span. Those developmentalists who have revised classical psychoanalytic theory, Erik Erikson notable among them, have provided a bridge from which we can view the psychological characteristics of adolescence, middle age, and old age in social terms.

Freud's most important insight, which is rarely seriously challenged, is that humans are not always conscious of their own motives. He attributed great strength, durability, and enormous motivational properties to unconscious impulses and warned that the rational person and the rationalizing person are not easy to tell apart. We will have much to say about the influence of Freud's views in the latter chapters of this book.

SOCIAL LEARNING THEORY

Long ago, the English philosopher John Locke (1632–1704) said that the mind of the infant is a *tabula rasa*—a blank slate with very little predetermined but on which experience could write whatever chance or conscious planning might produce. John Watson was among the first psychologists to champion this view; an important tenet of his behaviorist view was that the child *learns to be* what he or she becomes, usually in a social context. Since Watson did not have much learning theory to work with, he could only condition infants and children to make simple responses and dream of the day when anything could be taught. And Watson assumed that with correctly selected techniques anything could be learned, by almost anyone.

Several theories of learning were developed after Watson took his stand, and each produced its own brand of social learning theory. Clark Hull believed that all learning was based on drive and drive-reduction, and Neal Miller and John Dollard wrote a social learning theory based on Hull's ideas. B. F. Skinner had no use for Hull's views because the concept of drive seemed to him circular, and so Skinner explained all learning on the basis of external reward and punishment as another learning-orientated psychologist, E. L. Thorndike, had begun to do years before.

A rather different brand of social learning theory was developed by Albert Bandura and Richard Walters in the decade between 1955 and 1965. Bandura and Walters accepted the idea that conditioning, reward, and punishment all contribute to social development, but they questioned whether all (or even most) of what actually goes on during childhood learning could be explained in these terms. Children learn by observation, Bandura argued, and this type of learning can take place without any direct reward or punishment at all. This approach has become extremely influential because it speaks directly to the issue of *processes* of social development, and it has inspired a compelling body of research. Some aspect of social learning theory is mentioned in every chapter of this book.

PRESENT TRENDS

The three theories just discussed are so broad and all-encompassing that today we think of them more as viewpoints than as rigorous scientific formulations. At one time it was felt that a single theory of development would prevail over the others, but it has become plain that agreement at this global level is impossible. Bettye Caldwell and Julius Richmond (1962) have put the matter well, surveying the emerging trends in developmental theories. Selection 1 contains an abridged account of their analysis.

SELECTION 1

THE IMPACT OF THEORIES OF CHILD DEVELOPMENT

Bettye M. Caldwell and Julius B. Richmond

IMPLICATIONS FOR FUTURE THEORIES

What thoughts can now be projected about the child development theories of the future? Undoubtedly they will continue to be prevalent both at the scientific level and as part of each individual's general philosophy. The individual theories will change only as rapidly as cultural changes occur, and presumably those cultural changes will be at least in part a function of the rapidity of scientific change. However, we will make a few predictions about the characteristics of heuristic child development theories of the future:

1. Extrapolation from research data will not be so extreme.

The science of behavior has matured into a more conservative, slightly subdued stage. Professionals in the field have themselves matured somewhat. Also the interdisciplinary origin of many of the reasonably stable parts of child development knowledge is conducive to conservatism.

The young Watson, with little knowledge of genetics and its constitutional limitations upon adaptability of the organism, could assert that he could take any four healthy infants and make them whatever type of adult he wished. The somewhat provincial Freud, unaware of the nascent body of data from cultural anthropology, could assume that the memories and fantasies of individuals from a fairly narrow sociocultural context represented universal attributes. Today's theorists are no longer permitted the luxury of being uninformed about work in any area of knowledge which might limit the predictions from a given theoretical system. With greater availability of information which might make predictions hazardous, the theories themselves will become more cautious about specific predictions.

2. Future theories of child behavior will be concerned with a broader time spectrum.

The view of the child as a miniature adult is outmoded. But in its place has come with too much finality a view of the child almost as an eternal child. The child *is* a future adult, as he is a future adolescent and a future senescent. The 6-month-old baby who experiences a certain type of mothering will presumably carry some residual of that experience with him at age 3 or 13. Since each type of later experience may modify the nature of the residual, such differences need to be fully explored. Useful child development theories of the future will be concerned with predictions which span wide segments of the developmental curve, not just one narrow section.

3. Future theories of child behavior will be related to broader aspects of social theory and philosophy. . . .

[Each] enduring or influential child development theory is related to powerful currents of social history. Within the past few decades even the seemingly remote physical sciences have had to face such a relationship. There is now less talk about a separation of science from values. Certainly in the field of child development no such separation is possible. We rear

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Adapted and reprinted from Bettye M. Caldwell and Julius B. Richmond, The impact of theories of child development. *Children*, 9, 1962; 73–78. Reproduced by permission of Bettye M. Caldwell.

children to fit into a particular culture, on the basic premise that the culture is somehow "good" or at least acceptable.

The past two decades have seen considerable sniping at Watson for the naïveté of his theories, with an occasional implication that he was heartless and cruel for denouncing mother love and the child-rearing practices of most parents. Such criticism fails to recognize that Watson was far more explicit than most theorists about the behavioral attributes he wished to foster. He concludes one of his books (Watson, 1928) with a formal apologia to critics who have taken him to task for having no "ideals" for bringing up children, commenting perceptively that different programs of care fit different civilizations. Then he describes briefly the kind of child he had in mind when making his child-rearing suggestions, the kind he considered best adapted to the changing America of the late twenties:

> We have tried to sketch in the foregoing chapters a child as free as possible of sensitivities to people and one who, almost from birth, is relatively independent of the family situation. . . . Above all, we have tried to create a problem-solving child. We believe that a problem-solving technique (which can be trained) plus boundless absorption in activity (which can also be trained) are behavioristic factors which have worked in many civilizations of the past and which, so far as we can judge, will work equally well in most types of civilizations that are likely to confront us in the future. [Watson, 1928]

Undoubtedly, many persons would not agree with Watson's goals, but it is to his credit that he attempted to relate his theory to the social milieu.

4. Future theories of child development will not attempt to answer (or predict) everything about child development for all time. They will modestly relate themselves to one sociocultural group—until something is proven to have universal relevance—and for a finite scientific era.

New discoveries can outmode existing theories overnight. For example, future research on behavioral genetics might drastically modify many of the assumptions underlying research on the effects of specific parent practices on child behavior. Any heuristic theory will be quick to incorporate new data, thus building a more stately theoretical structure. Victor Hugo's tribute to the power of an idea whose time has come might well apply in reverse here, for nothing is more effete than a theory that has outlived its time.

THE CENTRAL IMPORTANCE OF METHOD AND RESEARCH EVIDENCE

In this book we have sought to exemplify and explain the research strategies and sources of evidence that bear on various phases and aspects of development. Although some of the findings may surprise the reader (or run counter to "intuition"), others may seem so obvious that formal investigation appears unnecessary. But it is necessary. In *Tactics of Scientific Research*, Murray Sidman (1960) made the point this way:

> Sometimes, when a commonly observed type of behavior is demonstrated in the laboratory, we hear the remarks, "So what! Everybody knows people behave like that . . ." Such a statement assumes beforehand that common observation is an adequate substitute for controlled observation. The two may, at times, be in agreement, but there is no predicting this before ex-

> perimental studies are undertaken. Everyday observation of human behavior is notoriously unreliable. In our impressions and interpretations of behavior as it goes on around us, we tend to overlook many properties of the behavior and of its controlling variables. We read into our descriptions of behavior much that is not actually there, and assume on too little evidence that two or more types of behavior are the same simply because they look the same. The very language of our everday discourse often serves to obscure the critical data. [P. 29]

Everyone "knows," for example, that a child will be more likely to do something for which he or she has been rewarded than to do something that has not previously brought positive consequences. Nonetheless, it was only after much basic laboratory research on the timing and scheduling of rewards that such remarkable and practical accomplishments as successfully teaching language to mute psychotic children (e.g., Lovaas, Berberich, Perloff, and Schaeffer, 1966) or producing effective "teaching machines" (Skinner, 1968) became possible.

In developmental psychology many "obvious" facts have been cast into serious doubt by systematic investigation. For example, it is widely held that a child's interpersonal aggressive behavior may be reduced by observing aggression through movies, television programs, and children's stories. This notion, often referred to as the *catharsis hypothesis*, suggests that aggressive tendencies may be "drained off" by the vicarious experience of observing violence. However, as we shall see, a number of carefully designed experiments with children and adolescents have shown that observing aggression may actually *increase*, rather than decrease, an observer's willingness to aggress against other people.

Research is not simply the scientist's version of casual observation. Instead, it is a very special class of activity in which a systematic effort is made to obtain and evaluate information about one or more phenomena according to a set of explicit rules. It is to the various ways in which developmental psychologists have undertaken this task that the next chapter is devoted.

SUMMARY

Developmental psychology studies all the changes in physical, mental, and social functioning that occur throughout the life span from conception to death. *Development* refers to a process of change in growth and capability over time, as a function of both maturation and interaction with the environment.

The idea of childhood as a special period emerged in seventeenth- and eighteenth-century philosophy and did not become scientifically important until the middle of the nineteenth century. Darwin's theory and observations played an important part in the birth of contemporary developmental psychology. G. Stanley Hall made a major contribution by devising objective methods as a substitute for casual observations and studying groups of children over a wide age range. The impact of Alfred Binet, Sigmund Freud, and John Watson led to much interest in developmental research and the emergence of clinics for assessing and advising parents. Interest declined in the 1940s but was revived in the 1950s with a new emphasis on the processes that underlie developmental changes rather than toward describing the changes themselves. This revival of interest reflected an important shift from chronological to functional analysis.

One of the major issues in contemporary psychology involves the relative status of biological and environmental determinants of behavior. It is difficult to determine the contributions of each factor, since an individual's hereditary endowment and the environment interact in order to produce behavior. Another important issue is the behavioral versus the cognitive emphasis. Watson's behaviorism ruled out the study of mental processes because they could not be observed directly, but contemporary psychologists are successfully applying objective methods to the study of cognition. Finally, developmental psychologists differ in the relative emphasis they give to continuous versus discontinuous shifts in development.

Theories serve an important explanatory role in organizing and condensing facts that are already known, and they should enable us to predict future events. Three important theories are related to developmental psychology: maturational theory, psychoanalytic theory, and social learning theory. Theories offer predictions that must be scientifically tested by research.

Methods of Developmental Research

CHAPTER

2

OUTLINE

THREE METHODS OF DEVELOPMENTAL RESEARCH
- The Experimental Method
- The Correlational Method
- A Comparison of the Experimental and Correlational Methods
- Case Study Methods
- The "Clinical" Case Study
- Single-Subject Experimental Designs

LONGITUDINAL VERSUS CROSS-SECTIONAL APPROACHES TO DEVELOPMENTAL RESEARCH
- The Logic of Longitudinal Research
- The Logic of the Cross-Sectional Approach

CONVERGING METHODS IN DEVELOPMENTAL RESEARCH

SUMMARY

In Chapter 1 we considered the nature of development and examined some of the issues surrounding the concept. The present chapter deals with the methods used in developmental research and explores their strengths and weaknesses.

THREE METHODS OF DEVELOPMENTAL RESEARCH

Every developmental investigation can be characterized in terms of whether its underlying strategy involves the *experimental, correlational,* or *case study* approach. Although all of these methods involve *observation* of one sort or another, they differ in crucial ways.

The experimental method involves actual manipulation of various treatments, circumstances, or events to which the person is exposed; it thereby permits strong inferences as to causal relationships between these manipulations and subsequent behavior. The correlational method explores the existing relationship between two or more events or variables but, although it provides a relatively large informational yield, does not typically permit causal inferences to be drawn directly. The case study method involves systematic description of the behavior of a single individual, thus providing a depth of information not otherwise typically available but severely limiting what can be inferred about children generally, inasmuch as any one child may be too unique to tell us what most children are like.

THE EXPERIMENTAL METHOD

The experimental method can be illustrated by tracing a specific study done by Coates and Hartup (1969). The point of departure for Coates and Hartup's research was an earlier finding that children's learning of an adult's behavior was greater if they had been asked to describe out loud—i.e., to verbalize—each act as it was observed than if they had been permitted to watch the adult's actions passively. Coates and Hartup wanted to examine the relationship between chronological age and the influence of such verbalizations on observational learning by young children. In their study children of two age groups, four-year-olds and seven-year-olds, observed a film of an adult's performance of some novel tasks. Before watching this film, though, the children were divided

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into groups that received one of three sets of instructions. Only two need concern us here: in the *induced verbalization* condition, the children were given specific labels to use in describing the model's actions as they occurred; in the *passive observation* condition, they were given no instructions regarding verbal descriptions.

Coates and Hartup, like most investigators, were guided by an initial set of theoretical possibilities. Specifically, they believed that younger children do not spontaneously produce relevant verbalizations while learning visually, whereas older children do produce and employ such verbalizations. The investigators also felt that if younger children were helped to produce relevant descriptions or labels, their learning would be improved.

On the basis of these hypotheses, the following predictions were made: (1) seven-year-olds in the *passive observation* condition will show greater observational learning than four-year-olds in the *passive observation* condition; (2) four-year-olds will show greater observational learning in the *induced verbalization* condition than in the *passive observation* condition; and (3) there will be little difference in observational learning in the *induced verbalization* and *passive observation* conditions among the seven-year-olds, for they presumably produce relevant verbalizations spontaneously.

So far, then, the investigators have taken a finding from earlier studies and combined it with theory to generate the three predictions or *experimental hypotheses* stated above. At this point the three predictions are still untested. They are no more than ideas, but the ideas are well formulated as general propositions that can be tested in a *controlled situation*. The controlled situation not only must meet the requirements of the propositions under test but also must exclude or minimize the effect of other factors not hypothesized to be relevant. What are these requirements in the present example? First, a situation must be created in which children have an equal opportunity to be exposed to novel behaviors and are either asked or not asked to verbalize a description of what they see. Their recall (learning) under these two conditions must then be compared. Second, the subjects must differ in age in the manner prescribed by the hypotheses. Finally, precise measurement of the *variable of interest*—in this case the children's reproduction of the model's actions—must be possible.

To meet these requirements, children in the Coates and Hartup experiment were brought individually to a mobile research laboratory by an adult experimenter who introduced them to a second adult. They were told that they were going to watch a movie, after which they would go into another room of the laboratory and "be asked to show what the man in the movie did" (1969, p. 558). Additionally, one of the adults demonstrated two novel behaviors (turning around and marching in place) which illustrated the type of things the child would see. To provide an adequate test of the experimental hypotheses, the film had to

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display a fairly large number of behaviors that met the dual criteria of being both novel and readily subject to imitation and verbal representation. The production met these qualifications admirably.

> A 7-minute color film . . . was prepared that depicted the behavior of a 25-year-old male model. The model displayed 20 critical behaviors. In order of presentation these were: has his hands over his eyes; puts his hands behind his back; builds a tower of blocks in a unique way; puts a toy on top of the tower; walks backward four steps from the tower; puts a baton in front of him on the floor; kneels down on one knee behind the baton; fires a pop gun at the tower; takes down the tower of blocks in a unique way; sits on a Bobo clown; hits the clown in the nose; hits the clown with a mallet; throws a ball at the clown; tosses a Hoola Hoop around the clown; drags the clown with the hoop to a corner of the room; walks backward four steps from the bean bag target; throws a bean bag between his legs at the bean bag target; walks backward four steps from the target; squats down with his back to the target; walks across the room whirling the Hoola Hoop over his arm. [1969, p. 558]

All of the children who participated in this experiment saw the live demonstration and film described above, but the type of instruction they received before the observational period varied.

In the *induced verbalization* condition, the experimenter indicated that he would describe what the actor was doing while the film was being shown and that the child should repeat his statements. A short practice session then ensued in which the child was asked to imitate a verbal description of the other adult's turning and marching. In the *passive observation* group, no verbalization instructions were given. Thus the condition or manipulation that the experimenter created, the *independent variable,* was the type of instruction.

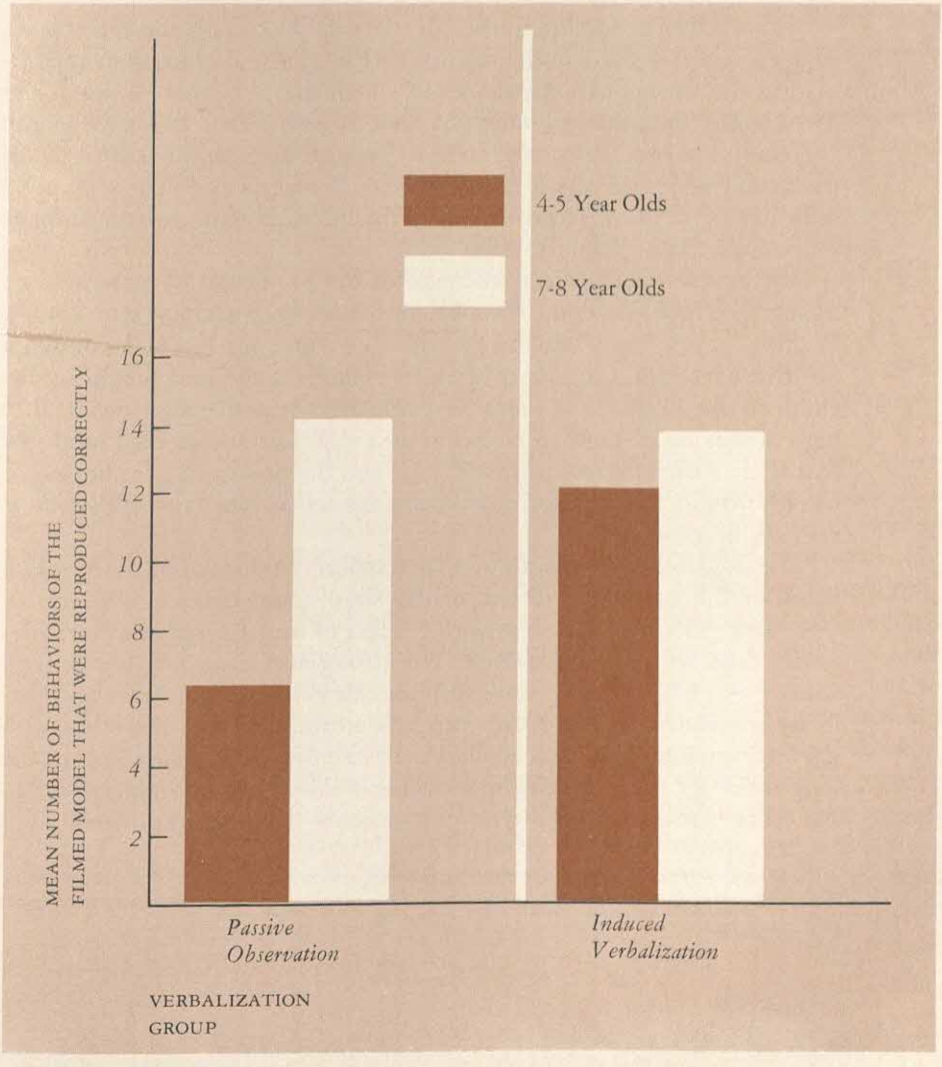
It is important to note how Coates and Hartup decided which children would receive which type of instruction. Ideally, of course, the investigators would want the two instruction groups to be as similar as possible except for the type of instruction given; preexisting differences between the groups in overall memory capacity, intelligence, or any number of other factors might easily obscure or confound the effects of the independent variable. While the goal of completely equating the groups of an experiment on all relevant factors is impossible to ensure, experience has shown that assigning people *randomly* to conditions tends to produce maximal similarity in the long run. (Technically, a *random assignment procedure* is one in which each potential subject has an equal chance of being assigned to any of the groups. This may be done by drawing the subjects' names blindly from a hat or by using a random numbers table or similar aid designed for the purpose.) Within each age group, children in the Coates and Hartup experiment were assigned randomly to either the induced verbalization or the passive observation group.

A *dependent variable* is a measurable aspect of the subject's behavior which changes as the independent variable changes. The term derives from the fact that these measures *depend upon* or are controlled by the experimental manipulations (which are *in*dependent in the sense that the experimenter can change them at will). In the Coates and Hartup experiment, the major dependent variable was the number of behaviors in the film that were correctly reproduced by the children. This measure was obtained by taking each subject, after he or she had watched the movie, into another room that contained all the objects with which the filmed model had played. The children, tested individually, were then asked to demonstrate what the man in the movie had done. They were first asked to show what the man did before playing with the toys, then what the man did with the blocks, and so on.

A portion of the results of this experiment is shown in Figure 2–1. The three experimental predictions considered here (see p. 21) re-

FIGURE 2–1

A portion of the results of Coates and Hartup's experiment showing that, as predicted, observational learning by younger but not older children is improved by inducing verbal descriptions of what they see. Data from Coates and Hartup, 1969.



ceived clear support. Of particular importance, the study demonstrates that asking young children to verbalize what they have seen can produce or *cause* improvements in learning, since this factor was manipulated directly as part of the experiment (cf. Neale and Liebert, 1973). In correlational research, direct manipulations are not used and thus we can rarely be as confident about cause and effect.

THE CORRELATIONAL METHOD

Correlation, as the name implies, deals with the co- or joint relationship between two or more factors or variables. The method involves questions of the general form: "Do variable X and variable Y go together or vary together in some way?" Questions of this type are frequently asked in developmental psychology: Is the child's performance in school related to the socioeconomic status of his or her family? Is there a relationship between late toilet training and compulsiveness in adulthood? Is the frequency of dating behavior during adolescence related to later marital success and happiness?

A characteristic feature of the correlational method is the fact that all subjects are observed under identical conditions. Rather than manipulating the events or experiences to which the person is exposed, the investigator measures phenomena that already exist. In studying the correlation between variables, researchers often compute a correlation coefficient. One commonly used coefficient, designated by the symbol r,* indicates both the direction and the magnitude of the relationship. It may range from +1.00 to −1.00.

The *direction* is shown by the sign of the coefficient. A positive sign means that high scores on X tend to be associated with high scores on Y, and low scores on X tend to go with low scores on Y. For example, a positive correlation is found between children's age and height; older children are likely to be taller. Conversely, a negative sign means that high scores on X tend to be associated with low scores on Y and low scores on X with high scores on Y. Age and the quickness of reflexes are usually found to be negatively correlated; as people grow older, their reflexes become slower.

The *magnitude* or strength of a correlation is indicated by the absolute value of the coefficient (disregarding sign). Correlation coefficients of *+.60* and *−.60* are equivalent with respect to how strongly the variables under consideration are related. The strongest relationship is indicated when $r = +1.00$ or $r = -1.00$; in both cases the two variables are perfectly correlated so that either can be determined from the other with perfect accuracy. As the coefficient decreases in absolute value, the magnitude of the relationship becomes weaker, and the ability to estimate one variable from the other decreases. A coefficient of 0.00 indicates that the variables are unrelated, in which case knowledge of one does not tell us anything at all about the other.

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*There are several types of correlation coefficients of which r, the Pearson product-moment correlation coefficient, is only one. Our comments on correlational techniques also apply to the other types.

A word of caution should be introduced here. Because correlation coefficients range in absolute value from 0.00 to 1.00, it is tempting to view them as percentages (i.e., to assume that a correlation of .60 means a "60 percent" correlation). From this faulty assumption one may be tempted to conclude that a correlation of .50 is twice as large as one of .25. This is an error. The appropriate rule of thumb is to compare squared correlation coefficients to get an idea of the relative strengths of each. Thus, in a sense, a correlation of .80 is approximately *four* times as large as a correlation of .40 (i.e., $.80^2 = .64$ and $.40^2 = .16$; .64 is four times .16).

A COMPARISON OF THE EXPERIMENTAL AND CORRELATIONAL METHODS

The critical issue that distinguishes experimental and correlational research is whether or not we can infer a causal relationship between (or among) the variables under investigation. In a true experiment, when a relationship is found, cause-and-effect is always implied; that is, the independent variable can be said to lead to a change in the dependent variable. Correlational findings, on the other hand, reveal relationships between (or among) variables without *necessarily* implying causality—although some causal relationship may underlie the findings. For example, there is a positive correlation between the amount of ice cream eaten by children in a particular city on summer days and the number of children who drown on those days. But drownings do not cause an increase in ice cream consumption nor, contrary to popular opinion, does eating ice cream markedly increase the likelihood of cramps and subsequent drowning. Rather, it is a third variable—temperature—that is causally related to both of the other variables. Warmer weather makes it more likely that children will be both swimming (and drowning) *and* eating ice cream.

It is, unfortunately, easy to misconstrue some developmental studies as experimental when they are really correlational in character. To illustrate this point, consider the following hypothetical example. A school psychologist notices that the mothers of many of the children who have behavior problems seem particularly impatient in dealing with their children. To check on this observation a systematic investigation is conducted. Specifically, twelve problem children and twelve children with no reported school difficulties are asked to work with their mothers on a standardized task which requires an interaction between mother and child. Two independent raters are asked to observe the mothers during the sessions and evaluate their interaction with their children on a seven-point scale (1 = very patient, 7 = very impatient). The raters agree almost perfectly. For each mother and child, the psychologist now has reliable information both as to whether the child is considered a school problem or not and a reliable rating of the mother's patience.

TABLE 2-1
DATA FROM A HYPOTHETICAL STUDY COMPARING THE RATED PATIENCE OF MOTHERS WITH PROBLEM CHILDREN AND CHILDREN WITH NO REPORTED SCHOOL PROBLEMS. Because the study is correlational and merely measured existing relationships, we cannot be sure whether mothers' impatience caused school problems or whether school problems made mothers more impatient. It is also possible that some third variable caused the relationship.

PROBLEM CHILDREN		CHILDREN WITH NO REPORTED PROBLEMS	
Family	Rating of Mother	Family	Rating of Mother
A	[illegible]	M	[illegible]
B	[illegible]	N	[illegible]
C	[illegible]	O	[illegible]
D	[illegible]	P	[illegible]
E	[illegible]	Q	[illegible]
F	[illegible]	R	[illegible]
G	[illegible]	S	[illegible]
H	[illegible]	T	[illegible]
I	[illegible]	U	[illegible]
J	[illegible]	V	[illegible]
K	[illegible]	W	[illegible]
L	[illegible]	X	[illegible]
Total	[illegible]		[illegible]
Average	[illegible]		[illegible]

Note: 1 = very patient, 7 = very impatient.

Note that the investigator made no attempt to influence the mother's interaction with her child; this behavior was merely measured as it occurred. When the psychologist in our example proceeds to analyze the findings, they might be arranged in a manner such as that shown in Table 2-1. Then the average ratings of the mothers' patience for both the problem and the no-problem children (4.3 and 5.5, respectively, in our example) can be compared with a statistical test. Finally, the results might reasonably be described by saying: "As predicted, mothers of problem children were found to be less patient in parent-child interactions than were those of children with no reported behavioral difficulties in the school situation."

When the results are described this way, it might be tempting to conclude that the ability of some children to get along with their peers, please their teachers, and otherwise avoid being labeled "problems" is partially caused by the patience of their mothers, just as the inability of other children in these areas results from maternal impatience. To draw this conclusion may be erroneous, however, for it treats the study as if it involved an experimental manipulation, which it did not. In fact, the study does not necessarily indicate that a mother's impatience can lead to problems for her children.

It is possible that the impatience of the mothers and the problems of their children "go together" because children who are uncooperative or unruly have an adverse effect on their parents' interactions with them—that is to say, "problem" children may produce impatient parents. Or it may be that some third variable, such as the social class or health of the families involved, is influencing the ratings of both the mothers and the children. Because the investigator merely obtained measures for each mother-child pair without experimental intervention, there is no solid basis for distinguishing among these alternatives; no causal relationship can be inferred. However, the occurrence of either will help to predict the occurrence of the other, as they go together.

In a sense, then, correlational research compromises the control that is provided by the experimental method for the sake of economically making a broad inspection of a particular problem. By measuring existing characteristics of the subject, it also often permits the naturalness of the situation to remain; the very absence of intervention may bring the researcher closer to "real life" than is typically possible with experimental investigations. Behavior is almost always multiply determined (i.e., it is caused by a number of variables operating at the same time and in conjunction with one another), and the correlational approach can easily take this fact into account by studying the relationships among many variables. Although the experimental approach also can deal with multiple determinants of behavior by manipulating a number of different independent variables at once, it is rare in practice for a single experiment to employ more than three or four independent variables, and many experiments have only one.

Generalizing from representative samples In alliance with some statistical procedures, the correlational and experimental methods both supply the scientist with an important kind of power: the power to make general statements about a population or large group of individuals on the basis of observing only a portion of the individuals in that population. These methods allow the developmental psychologist, for example, to observe a relatively small group of children, sometimes as few as thirty or forty, and draw conclusions about thousands of unobserved children. Can such generalization be done without making serious errors?

Yes, to a remarkable extent, as long as the researcher is careful to observe a group of individuals who reflect all the characteristics (sex, age, health, intelligence, and so on) of the population to which they belong. A small group in which all the characteristics of the to-be-generalized-to population are included in correct proportions is called a representative sample. A description of development based on the observation of a properly drawn representative sample of children applies to many more children than were—or ever could have been—observed. (In the other hand, descriptions of behavior based on unrepresentative samples are limited in scope to describing the particular individuals observed.

CASE STUDY METHODS

Systematic biographies of children from birth or early childhood constituted the earliest source of data for developmental psychology and are still useful today for some purposes. Case study methods are the most flexible tools we have in the scientific search because they impose the fewest constraints on the way observation is to be undertaken and can be pursued in nearly any situation. But this latitude has its price. Because one or two children hardly make up a representative sample, we cannot be sure that what is true for them also holds for any larger group of children.

Case studies are often useful for didactic purposes, to provide a prototypical example of some form of behavior or behavioral development. To illustrate both the remarkable verbal ability of children of very high intelligence and the continuity and growth of this ability over time, Munn (1946) presented the following poem, written by a seven-year-old girl with an IQ of 188:

> Oh, Master of fire! Oh, Lord of air,
> Oh, God of waters, hear my prayer!
> Oh, Lord of ground and of stirring trees,
> Oh, God of man and of pleasant breeze,
> Dear Father, let me happy be—
> As happy as a growing tree! [P. 418]

Noting that "follow-up studies of children whose IQs were very high when first determined have shown that, in most instances, the promise of early childhood has been fulfilled," Munn then reported a story written by the same child at twelve:

> Now, behold, there was once an Untutored Child of Nature whose abode was in the wildest wilds of Africa, whose name was Itchy-galoop. And he lived in primitive bliss and ate mangosteens and fried pig, and his drink was the limpid waters of the brook. And he wore a neat but not gaudy garment of leaves, and used no hair tonic.
>
> And it came to pass that a Missionary came unto those wilds and when he beheld Itchy-galoop with his incumbrous garments he was aghast and said unto him:
>
> "Untutored Child of Nature, the way thou goest thou wilt inevitably end up in perdition, so come to my tent and be baptized tomorrow at nine A.M."
>
> And Itchy-galoop was awed by the majestic and noble aspect of the Missionary's nose, and consented.
>
> And the Missionary was glad, and said unto him: "I will now proceed to civilize thee." So he got out his second-best pair of pants and a violet shirt and arrayed Itchy-galoop therein.
>
> And it come to pass that when Itchy-galoop had learned to read, the

> Missionary presented him with a book of the science of medicine and hygiene. And Itchy-galoop looked therein and was dismayed. He saw plainly that it was a miracle he had survived so long, and began industriously to study.
>
> And he boiled the limpid water of the brook before he quaffed thereof, and partook no more of fried pig which is hard to digest, and washed his mangosteens before he ate of them. And he thumped his chest doubtfully and felt of his pulse, and foresaw that he was dying of tuberculosis and heart disease. And he said, "Yea, it is a certainty that I have every disease in this book from appendicitis on." So he took unto a folding couch that the Missionary had brought and groaned when he thought he ought to.
>
> And when he had survived for a week in this precarious state he awoke one morning with a feeling of unaccountable happiness. And he said unto himself, "This is verily the light-heartedness before the end," and felt his pulse. And suddenly it came to him that the sky was blue and that he was feeling better than ever in his life before. A great conviction dawned on him and he arose and went in search of the Missionary and said to him with menacing aspect, "Get out of here on the double-quick, and if you come into my vision perambulating around in this vicinity again I will immediately examine into the contents of your cranium with my primeval stone hatchet."
>
> And Itchy-galoop stood on a high hill and when the speck of Missionary had faded into the distance he took the book and wrapped his trousers around it and threw it far out into the sea. And he sighed with happiness and went and ate some mangosteens without washing them. [Munn, 1946, p. 418]

The author of this lovely fable, Munn reports, grew up to become "a writer of poetry and fiction which ranks with that of the greatest writers" (p. 418).

With these examples Munn has illustrated (1) a qualitative difference between the abilities of people with superior and average IQs, and (2) the persistence of achievement in high IQ individuals as they mature. Case study material in this instance clearly serves the purpose of painting a vivid picture of the phenomena it is intended to exemplify. Nonetheless, there is no individual or group introduced directly for purposes of comparison. The reader could better understand the contribution of IQ to literacy if the six-line poem written by a child of superior intelligence had been compared with a six-line poem written by a child of the same age but of average intelligence. Instead Munn (and the author of any case study) depends upon certain rough-and-ready assumptions by the reader, who will inevitably make his or her own comparisons. As far as it goes, there is nothing wrong with this. One does not need much experience with children to recognize that the poem reprinted above is beyond the capacity of most seven-year-olds. But how much beyond? Our guesses based on the seven-year-olds we have known cannot provide this information. In sum, the case study method can provide certain gross discriminations in some clear-cut cases, but for finer discriminations we need comparisons the case study method does not provide.

The consensus is that case studies are most helpful to the developmentalist when circumstances preclude the use of other methods. Investigations of the development of so-called feral children—human infants who, lost or abandoned by their parents, spent the early years of their lives in the wilderness—have been approached in such a manner (Davis, 1947). Obviously, there are constraints on the experimenter who wishes to study the development of children subsequent to years of social isolation. He or she cannot in good conscience set up the relevant experimental study because it would involve a comparison between two groups of children, one consisting of children reared normally, and a second consisting of children who are banished to the wilderness to fend for themselves or to be reared by wild animals. Nor does the investigator have the opportunity to employ the usual correlational techniques, for there are too few such individuals for any statistical study to be meaningful. The researcher's only alternative is to wait for the discovery of such a child and to fit the pieces of the child's life together into a case study.

THE "CLINICAL" CASE STUDY

Several variations on the case study method increase its scientific utility and information yield. One is the "clinical" method used extensively by Piaget.*

In his early work Piaget observed the development of his own three children at home. He recorded his observations and later published them in two books, *The Origins of Intelligence* and *The Construction of Reality in the Child.* His research was "child-guided" in that his aim was to follow the child's natural way of thinking. For example, when his daughter Jacqueline was between two months and six months of age, Piaget observed, milestone by milestone, the development of the infant's ability to guide her hand with her eyes. He watched and recorded each faltering step and permitted the child's natural development (rather than his own preconvictions) to form the basis for his observations. This is a usual hallmark of case studies.

At the same time, however, Piaget intervened occasionally, as we would expect a skilled clinician to do, in order to clarify for himself the structure and content of the child's thoughts. When another of Piaget's daughters, Lucienne, was two years old, he noted her fledgling success at removing a watch chain from a partially open matchbox. To probe the child's understanding of how the matchbox opened, Piaget altered the situation by virtually concealing the chain in the box so that Lucienne had to slide the box open systematically—or fail in her mission. With older children the clinical probe of thought took on a verbal base. Piaget began to interview not only his own but other children, asking them question after question: "Why do boats float?" "Where does the sun come from?" "What causes the tide?" and followed up on each

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*Here the word "clinical" is used in the sense of deeply probing only and does *not* refer to clinical-level problems or abnormalities.

answer until its full basis and meaning to the child were apparent. From material gathered in this way, Piaget fashioned one of the most important psychological theories of the century.

SINGLE-SUBJECT EXPERIMENTAL DESIGNS

Most versions of the case study method involve the nonmanipulative observation of a single individual. It is possible, however, to employ the experimental method with a single subject and to demonstrate the controlling influence of certain environmental events upon behavior.

The logic of the single-subject experimental design involves careful measurement of some aspect of the subject's behavior during a given time period (i.e., as a *baseline* or control procedure), the introduction of some environmental modification or treatment during the next (*experimental*) time period, a return to the conditions that prevailed during the control period, and finally a second introduction of the experimental manipulation. The intent of this procedure, sometimes referred to as an *ABAB* design, is straightforward. If behavior changes from *A,* the control period, to *B,* the experimental period, reverses again when the experimentally manipulated conditions are reversed (i.e., returns to *A*), and "re-reverses" when *B* is again introduced, then there is little doubt that it is the manipulation, and not chance or uncontrolled factors, that produced the changes.

The *ABAB* single-subject design may be illustrated by a study conducted by Tate and Baroff (1966) in which methods of reducing the self-injurious behavior of a nine-year-old boy, Sam, were investigated. The lad, who had been diagnosed as psychotic, engaged in a range of self-injurious behaviors including "banging his head forcefully against floors, walls, and other hard objects, slapping his face with his hands, punching his face and head with his fists, hitting his shoulder with his chin, and kicking himself." The investigators also reported that such acts were "a frequent form of behavior observed under a wide variety of situations."

Despite his self-injurious behavior, Sam was not entirely asocial. In fact, it was noted that ". . . he obviously enjoyed and sought bodily contact with others. He would cling to people and try to wrap their arms around him, climb into their laps and mold himself to their contours." It was this observation that gave rise to the experimental treatment. Specifically, the investigators decided to punish Sam's self-injurious outbursts by the immediate withdrawal of physical contact. Their hope, of course, was that this contingent "time-out" from human contact would reduce the frequency of the behaviors that produced it.

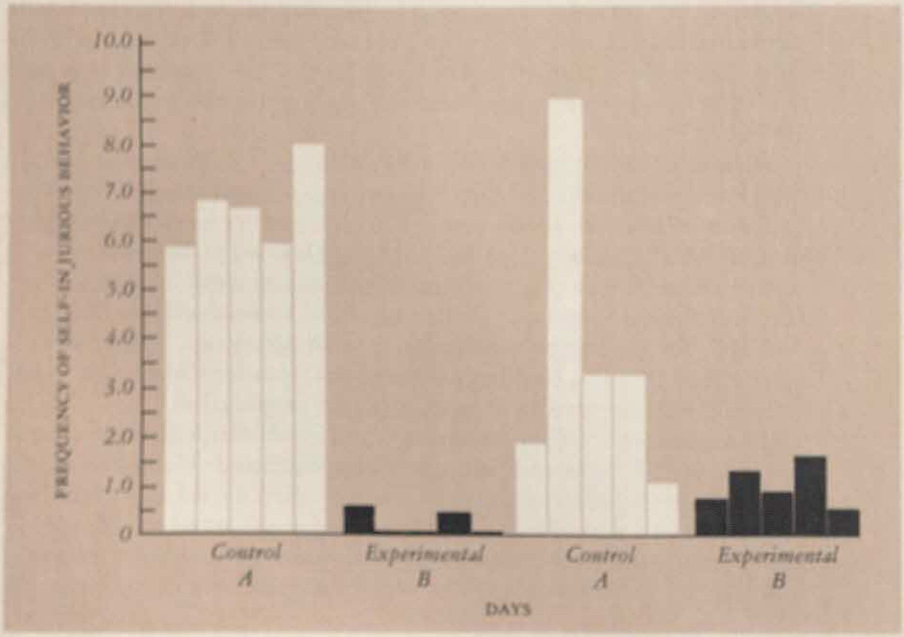
The study was run for twenty days and involved a daily walk around the campus for Sam, with two adult experimenters who talked to him and held his hands continuously. During the control days, Sam was simply ignored when he engaged in self-injurious behavior. During the experimental days, the adults responded to any self-injurious actions by immediately jerking their hands away from Sam and maintaining this time-out until three seconds after the last self-injurious act. The results of the systematic reversal of these procedures, shown in Figure 2–2, illustrate the dramatic effects of contingent punishment for reducing undesirable behavior in this case. It is clear that these changes resulted from the punishment rather than chance or accident, for the self-injury disappeared, reappeared, and diminished again according to the manipulation. Moreover, the "side effects" of the punishment procedure appear to be positive rather than negative. Tate and Baroff note that

> on control days Sam typically whined, cried, hesitated often in his walk, and seemed unresponsive to the environment in general. His behavior on experimental days was completely different—he appeared to attend more to environmental stimuli. . . . There was no crying or whining, and he often smiled. [1966, p. 283]

The Tate and Baroff study shows that the single-subject design can serve as a well-controlled experiment and can demonstrate convincing causal relationships. Rather than illustrating the complexity of an individual case, the design can be used to demonstrate a principle of behavior through the systematic treatment of one individual under controlled conditions. Nevertheless, as with all case studies, caution must be exercised in drawing inferences about the population at large.

FIGURE 2-2

Effects of the contingent punishment procedure in Tate and Baroff's study, illustrating experimental effects within a single-subject design. (The individual bars are data for each day of the experiment.) Adapted from Tate and Baroff, 1966, by permission.



LONGITUDINAL VERSUS CROSS-SECTIONAL APPROACHES TO DEVELOPMENTAL RESEARCH

Most developmental studies, regardless of whether they employ the experimental, correlational, or case study method, can also be categorized according to whether they take a longitudinal or a cross-sectional approach.

In a *longitudinal study* the same child or children are observed or tested repeatedly at different points in their lives, and stability or change in their characteristics or behavior is noted over time. Piaget's case study of the development of eye-hand coordination in his daughter Jacqueline is a clear example of the longitudinal approach, spanning with detailed observations a critical four-month period in the life of a single child. In a *cross-sectional study*, on the other hand, there is usually only one observation for each child, but developmental changes are identified by including children of different ages in the plan of the study. Development is charted, not by observing the change in one individual over time, as in the longitudinal method, but rather by noting the differences between children of different ages at the same point in calendar time. The experimental study by Coates and Hartup (1969) cited earlier is a cross-sectional investigation in which the development of a learning process was explored by including children of two different ages—four-year-olds and seven-year-olds.

THE LOGIC OF LONGITUDINAL RESEARCH

As the name implies, the longitudinal approach involves a lengthwise account of development; as such, it has long been recognized as the most obvious and direct way to actually "see" growth occurring. In one of the earliest longitudinal studies on record, Buffon measured the change in height of a single child over the seventeen years between 1759 and 1776. Somewhat later, age changes in height were charted in a larger and more representative sample of children who participated in the first and second Harvard Growth Studies. It was inevitable that the longitudinal method would be applied next to the development of truly psychological characteristics; and the emergence of emotional and social behavior, along with intellectual functioning, were soon the subject of longitudinal scrutiny. One such study, begun by Lewis Terman in 1921, focused on children with IQ test scores so high that many would consider them geniuses. Terman's aim was to follow the development of these gifted children to determine what kind of adults they would become and whether extraordinary events would attend their development. A Selection in which Terman himself describes his findings appears later in this book.

The longitudinal approach is well suited to studying almost any aspect of the course of development. More important, it is the *only* way to answer certain questions about the stability (or instability) of behavior: Will characteristics (such as aggression, dependency, or mistrust) observed in infancy or early childhood persist into adulthood? Will a traumatic event such as being abandoned by one's parents influence later social and intellectual development? How long will the beneficial effects of special academic training in the preschool years last? Such questions can only be explored by using the repeated measurement technique of the longitudinal approach.

The longitudinal approach, however, is plagued by disadvantages that may frequently offset its strengths. An obvious one is cost, inasmuch as the expense of merely keeping up with a large sample of individuals can be staggering. Then too there is the related problem of "sample constancy" over time. Experience has shown how difficult it is to maintain contact with people over several years (as long as thirty years in some longitudinal studies!) in a highly mobile society. And even among those who do not move away, some will lose interest and choose not to continue their participation. These "dropouts" are often significantly different from their more research-minded peers, and this fact may also distort the outcome of longitudinal findings. For example, a group of individuals may *seem* to show intellectual growth between the seventeenth and twenty-fifth year of life. What has actually happened, however, is that those who found earlier testing most difficult are the very ones who have quit the study and thereby spuriously raised the group average on the next round. Fortunately, new statistical techniques can partly remedy the situation (Labouvie, Bartsch, Nesselroade, and Baltes, 1974).

Even if the sample remains constant, though, the fact that children are given the same test many times may make them "test-wise." Improvement over time may be attributed to development when it actually stems from practice with a particular test. Changing the test from year to year would solve the practice problem but would raise the question of how to compare children's responses to different tests.

THE LOGIC OF THE CROSS-SECTIONAL APPROACH

The cross-sectional approach, with its focus on the behavior of individuals of different ages at the same point in time, avoids almost all the problems associated with repeated testing and avoids costly record keeping and sample loss as well.

The cross-sectional approach, however, is not without problems of its own. The most serious logical tangle is that age-related differences between subjects may result as easily from chance environmental events as from significant developmental processes. Suppose, for example, that a researcher devises a way to measure how imaginative children are and then tests a group of six-year-olds and a group of eight-year-olds as a first step in studying the development of imagination. Let us say that the six-year-olds were found to be more imaginative than the eight-year-olds. Can we then conclude that imagination declines within this period? Not without facing serious objections. If testing were carried out in, say, 1977, a critic might point out that our eight-year-olds were born in 1969 and our six-year-olds in 1971, which means that they differ in "generation" as well as age. Our society may have changed enough between 1969 and 1971 to make the experiences that influence the growth of imagination very different for different generations of children. For example, a new curriculum adopted to nourish the imagination may have been too late for the children born in 1969 but may have benefited the younger children. Alternatively, the country may have been recovering from an economic depression that more severely affected the lives of the older children, who were born closer to its lowest point. Since social conditions change, they can be expected to affect different generations differently, rendering in some cases differences between age groups in cross-sectional studies difficult to interpret.

This problem, which can also jeopardize longitudinal research, is not insoluble. If the researcher tested children ages six and eight in 1977 and then made a similar comparison among "new" six- and eight-year-olds in 1978, 1979, and 1980, age differences could be examined a bit more clearly. Certainly if age differences remained across generations, then more faith could be placed in theoretical conclusions. Thus, in our example, if eight-year-olds continued to show less imagination than six-year-olds no matter if their birth dates were 1969 and 1971, 1970 and 1972, 1971 and 1973, or 1972 and 1974, then the new curriculum or the economic situation probably did not cause the difference. Much of the talent and imagination required of developmental psychologists is channeled into designing research that will produce "clean" findings, that is, results not subject to conflicting interpretations.

CONVERGING METHODS IN DEVELOPMENTAL RESEARCH

Even from our relatively brief discussion it can be seen that each of the research methods employed by developmentalists has both its strengths and its weaknesses. There is, then, no one "best" method, and the selection of a specific method usually depends as much on practical considerations as on suitability. For these reasons it is generally recognized that no single investigation can definitely settle a question. Developmental psychologists rarely rely on one study (or even one method) to reach conclusions. They prefer to find consistent evidence from as many converging sources as possible.

A good example of this converging source approach is the investigation of the influence of television violence on the young. The earliest studies were simply case reports in which individual youngsters had apparently learned or copied violent or antisocial acts from a television show. Soon correlational studies disclosed a general positive relationship between the amount of aggressive behavior exhibited by children and adolescents and the amount of TV violence they viewed at home. And, finally, experimental studies began to demonstrate that the introduction of violent television programming in laboratory or even school settings directly caused an increase in young viewers' willingness to aggress against others. No single one of these studies or methods could have made a strong case for the contribution of television violence to aggressive behavior, but the combined body of evidence is highly persuasive (Liebert and Poulos, 1976).

Thus ends our foray into issues of the methods used by developmentalists. We will meet many of these issues again, however, in later chapters.

SUMMARY

Three major methods are used in developmental research: the experimental, the correlational, and the case study approach. The *experimental method* consists of the testing of experimental hypotheses in a controlled situation, which allows cause-and-effect relationships to be determined. This involves the manipulation of something by the experimenter, called the *independent variable,* and the precise measurement of the effects of this manipulation on some form of behavior, called the *dependent variable. Random assignment* is the procedure used to ensure that each subject has an equal chance of being assigned to either the experimental or the control group. This means that the groups are basically alike before the manipulation; then, if differences are observed after the manipulation, one can conclude that the independent variable had a causal effect.

The *correlational method* deals with the joint relationship between two or more factors and can answer questions of the form: "Do variable X and variable Y go together or vary together in some way?" In this method, nothing is manipulated by the experimenter; the situation is measured as it exists and subjects are observed under identical conditions. A *correlation coefficient,* r, is the statistic that indicates the degree of relationship between two sets of data by showing both the direction (positive or negative) and the magnitude (high or low) of the relationship. The correlation may range from a $+1.00$ (perfect positive relationship) to a -1.00 (perfect negative relationship), with 0 indicating no relationship. A positive sign means that high scores on X (child's age) tend to be associated with high scores on Y (height); the older the child, the taller he or she is likely to be. A negative sign means that high scores on X (adult's age) tend to be associated with low scores on Y (reflex speed); as adults grow older, their reflexes become slower. The higher the numerical value of the r, regardless of whether it is in a positive or a negative direction, the stronger and more certain is the relationship.

The case study method involves the detailed investigation of one subject, a systematic biography. The "*clinical*" *case study* is a more deeply probing variation, and as used by Piaget in studying his children involved careful observation and recording, interviewing, and occasional intervention.

The single-subject experimental design (*ABAB*) combines the application of the experimental method and the case study's focus on a single individual. This means careful measurement of the subject's behavior for a given period, followed by the introduction of some manipulation to modify the behavior for the next period, a return to the conditions of the first period, and finally a reintroduction of the manipulation. Tate and Baroff (1966) used this *ABAB* design to study a child's self-injurious behavior.

Each of these three methods has its strengths and its weaknesses, but the experimental method when appropriate is the preferred method of scientists because it provides a controlled situation which allows conclusions to be drawn regarding cause and effect. Correlational research which does not have these controls can only reveal the relationship between or among variables but cannot lead to cause-and-effect conclusions. However, correlational studies are important for studying conditions that cannot be manipulated and for measuring characteristics in a natural environment rather than in an artificial situation in a laboratory. Also, the correlational approach can make a broad inspection of a problem by studying the interrelationship of many variables. Both the experimental and the correlational methods may and should use *representative samples* which allow generalizations to be made about the findings for the larger population. In contrast, the case study method cannot do this because it involves a single subject. Therefore case studies should be used only when circumstances are not appropriate for other methods, such as unusual occurrences, or for extensive observation such as that provided by the deeper probing clinical method used by Piaget. Nevertheless, the case study method as used by Piaget and Freud has generated important theories. The single-subject experimental design incorporates the controlling aspects of the experimental method and therefore allows causative conclusions to be drawn about the manipulation's effect, but since it does not use a representative sample, this conclusion only applies to the particular subject in the experiment and one cannot generalize that the same results would be found for others.

Regardless of the method employed, most developmental studies take either a cross-sectional or a longitudinal approach. In a cross-sectional study, there is usually only one observation for each child, but developmental changes are identified by studying children of different ages. In a longitudinal study, the same children are observed and tested at different ages, which is the more direct way to actually measure growth but the method has the problems of repeated testing and potential loss of subjects.

Because every method has some weaknesses, developmental psychologists rarely rely on one study or even one method to reach conclusions, but find consistent evidence from as many converging sources as possible. A good example of the converging approach is the investigation of television violence viewing and children's aggressive behavior.

Early Growth and Development

CHAPTER 3

OUTLINE

CONCEPTION AND FORMATION OF THE ZYGOTE
  Extended Discussion—Twins and Other Multiple-Birth Individuals
DEVELOPMENT OF THE FETUS
  Influences on Prenatal Development
BIRTH
THE NEONATE
  Appearance
  The Prematurely Born Child
  Behavioral Repertoire of the Neonate
THE INFANT AS A COMPETENT INDIVIDUAL
  Selection 2—Patterns of Response to Physical Contact in Early Human Development
PATTERNS OF PHYSICAL GROWTH
  Major Periods of Growth
  Systems of Growth
  General Principles
  Rate of Physical Growth
MOTOR DEVELOPMENT
  Principles and Issues
  Development of Manual Skills
  Integrated Motor Acts: Some Milestones
SUMMARY

As *Homo sapiens,* all humans come to share certain attributes: they walk upright on two feet; they are able to manipulate the environment with a high degree of manual dexterity; and they possess a large, well-convoluted cerebrum. Each individual, however, also possesses unique characteristics, some of which appear to be inherited. Thus, *intraspecies* differences that result from an interaction of individual inheritance and environmental influences determine much of the behavior that each of us exhibits.

An overview of early growth and abilities—both physical and psychological—can serve as a useful starting point for tracing and understanding the development of human behavior; further amplification of some of the processes which we shall touch on here will be provided in later chapters. Our discussion begins with conception and those factors in development that are virtually universal for the species.

CONCEPTION AND FORMATION OF THE ZYGOTE

Humans begin their unique path of development at the moment of conception when the *gametes*—the female reproductive cell, the *ovum,* and its male counterpart, the *spermatozoan*—join to produce the *zygote,* or fertilized egg. Like all cells of the human body, the reproductive cells contain *chromosomes,* each of which has thousands of *genes.* The genes, which are segments of deoxyribonucleic acid (DNA), bear the genetic information which is passed on from one generation to the next.*

The exact structure and number of chromosomes are distinct and characteristic for each species, with the number ranging from as few as 2 to as many as 127 pairs (Sinnott, Dunn, and Dobzhansky, 1958). In all cells *except the gametes* the chromosomes consist of matching pairs, each member of which influences the same characteristics of the individual as does the other member. Human cells contain twenty-three pairs of chromosomes, twenty-two of which, the autosomes, are common to both sexes and one pair of which, the sex chromosomes, differs sharply in males and females. Figure 3–1 depicts the chromosomal complement of one cell for each sex. Note that the sex chromosomes in females are alike; they are called X chromosomes. Males, on the other hand, have one X and one Y chromosome, the latter carrying less genetic information and being smaller and lighter.

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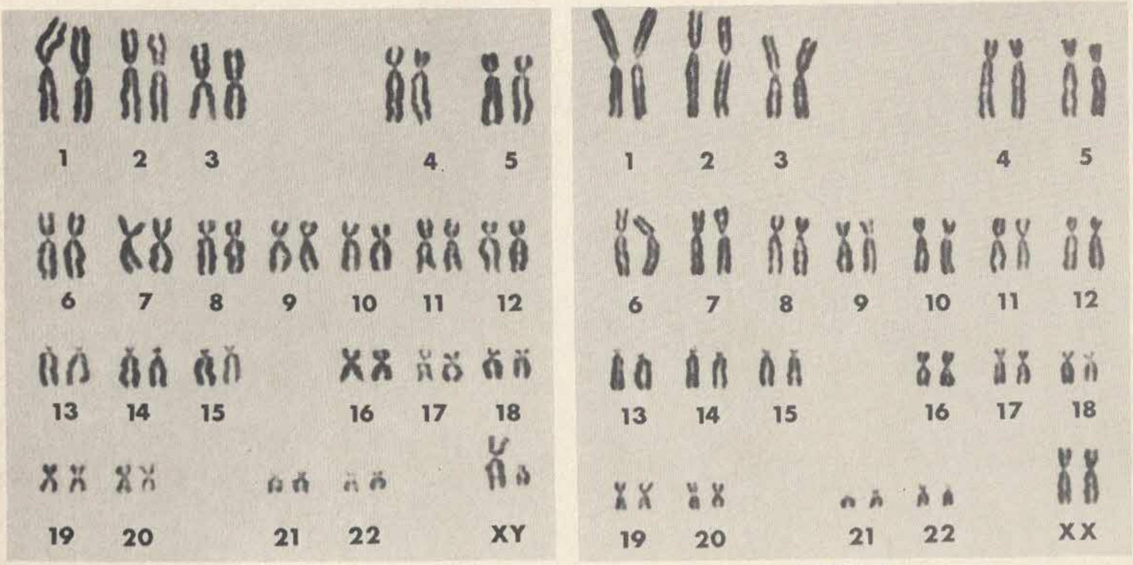
*Analysis of the DNA molecule by Watson and Crick in their 1953 Nobel Prize winning efforts has opened the way to further understanding of genetic transmission. Specifically, a coiled ladderlike arrangement of pairs of chemical structures, forming a double helix, permits DNA molecules to simply "unzip," divide, and then reproduce in a mirror-image fashion. The discovery itself was a magnificent drama, which has been recorded in a candid but confessedly personal history written by Watson (1968).



MALE

FEMALE

FIGURE 3–1
The chromosome complement in all human cells except the gametes. Each cell contains 22 pairs of autosomes that are alike for the sexes, and 1 pair of sex chromosomes that is different for males and females. Courtesy M.M. Grumbach, University of California, San Francisco.

During maturation the gametes undergo a special process, *meiosis,* which results in mature ova and sperm that carry twenty-three single chromosomes (that is, one chromosome from each of the original twenty-three pairs). When conception occurs, the father and mother each thus contribute half of the normal complement of chromosomes to the zygote.

An examination of the processes just described provides some explanation of the enormous variability found in humans. In meiosis, the chromosomes of each pair sort out by chance so that there are 2^{23}, or 8,388,608, possible different combinations of chromosomes for each possible ovum and sperm combination. Considering then that the particular ovum and sperm which form a new individual unite by chance, there are literally billions of chromosomal combinations available. The effects of the environment and other genetic mechanisms add even further to produce an almost infinite variety of individuals.

Sex determination Each parent contributes one sex chromosome to the offspring. Mothers pass on only an X chromosome, for they themselves carry no Y chromosomes. Fathers, on the other hand, may contribute either an X or a Y chromosome. The sex of the newly forming individual depends on whether an X-chromosome sperm or a Y-chromosome sperm unites with the ovum. A female zygote is produced when the twenty-third pair of chromosomes are both X chromosomes, whereas a male zygote results from a pair with one X and Y.

Theoretically, there should be an equal chance of the zygote's being male or female, inasmuch as one-half of the sperm cells contain the X and one-half contain the Y chromosome. In fact, more males apparently are conceived, for the ratio of male to female births is 106:100 (in the United States) even though a larger proportion of males die during uterine development. It has been speculated that more Y-chromosome spermatozoa penetrate the ova because their light weight enables them to reach the female gametes more quickly than the X-chromosome spermatozoa. The greater vulnerability of males to death and abnormality both preceding and after birth has been attributed to the relative lack of genes in the Y chromosomes.

Period of the ovum Fertilization takes place in the Fallopian tube leading from the ovary; the fertilized ovum then journeys downward and becomes implanted on the uterus wall, a process that takes about ten days. During this time, known as the period of the *ovum*, rapid cell multiplication by *mitosis* has already begun so that several dozen cells exist by the time migration is complete. In mitosis, the total number of chromosomes in a cell doubles and then the cell divides into two cells, each with a full complement of chromosome pairs. Within the rapidly multiplying mass a cavity appears; the outer layer of cells then develops into supporting tissues while the inner cells are destined to be the new individual.

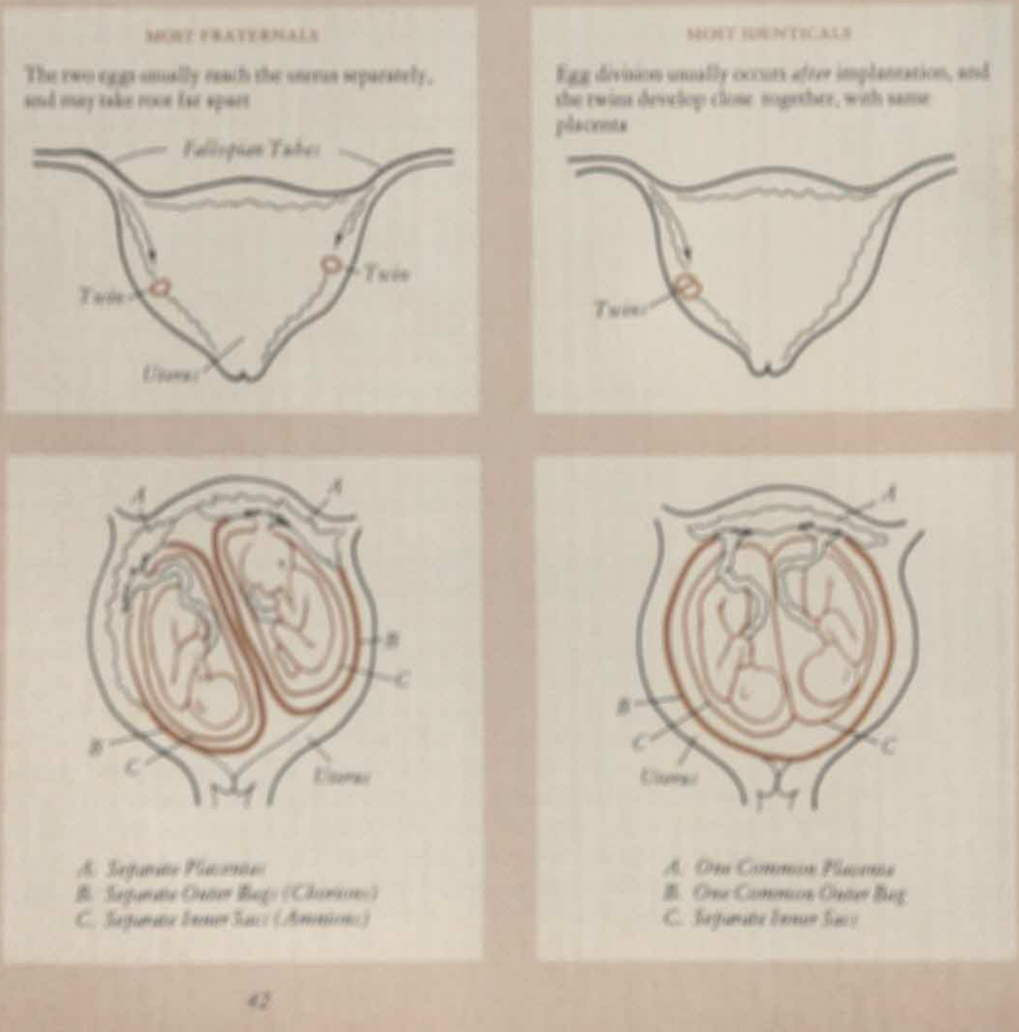
Among the supporting tissues are the amnion (inner sac), chorion (outer sac), and placenta. The developing organism floats freely in amniotic fluid in the amnion except for the attachment by the umbilical cord to the placenta. The umbilical cord is truly a lifeline in that its newly formed arteries and veins serve as a transport system between the developing child and the prospective mother. The vessels in the umbilical cord make indirect contact with the adult's system at the placenta. Nutrients, oxygen, some vitamins, drugs, vaccines, and some disease-producing organisms pass to the developing child, whereas waste materials pass in the opposite direction. This arrangement is the typical one that results in the birth of a single child. Occasionally, however, two or more individuals are conceived and born, an event that continues to intrigue most of us.

EXTENDED DISCUSSION

TWINS AND OTHER MULTIPLE-BIRTH INDIVIDUALS

Twin individuals come into being by one of two general processes.* Sometimes two ova are released from the ovaries and fertilized by two different sperm almost simultaneously. Each zygote attaches to the uterus wall and develops independently of the other, usually with separate placentas, amnions, and chorions (see Figure 3–2). In this case, the individuals who develop are *dizygotic*, or *fraternal*, twins; they are genetically no more alike than non-

FIGURE 3–2
The most usual manner of implantation and development of fraternal and identical twins. Adapted from Scheinfeld, 1973.



MOST FRATERNALS

The two eggs usually reach the uterus separately, and may take root far apart

MOST IDENTICALS

Egg division usually occurs *after* implantation, and the twins develop close together, with same placenta

A. Separate Placentas
B. Separate Outer Bags (Chorions)
C. Separate Inner Sacs (Amnions)

A. One Common Placenta
B. One Common Outer Bag
C. Separate Inner Sacs

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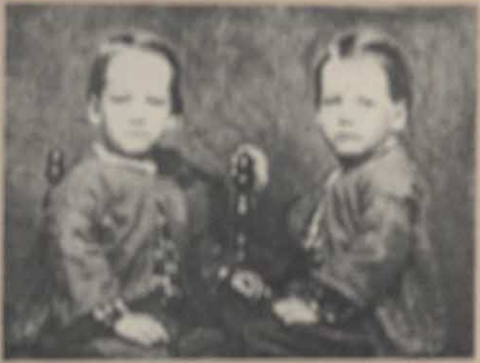
*This discussion is based on A. Scheinfeld, *Twins and Supertwins* (Baltimore: Penguin Books, 1973).

twin siblings and may be of the same or opposite sex.

The other way in which twins may form involves fertilization of one ovum by one sperm, the attachment of this zygote to the uterus, and a subsequent division of the developing mass into two units. Here the same placenta and chorion serve both newly forming individuals (see Figure 3–2). The resulting *monozygotic*, or *identical*, twins share an identical genetic makeup and thus are always the same sex.

Sometimes monozygotic twins' development is not completely separate and "Siamese" twins are born who are conjoined in various ways. The designation "Siamese" stems from Chang and Eng, born in 1811 in Siam, who were at that time a rare example of the phenomenon. Chang and Eng, joined at the breastbone, were known throughout the world and eventually became quite wealthy. At thirty years of age they married sisters and settled on a farm in North Carolina. The families—one consisting of ten and the other of twelve children—lived in separate houses, with their respective father-husband and his attached brother alternating the place of residence. The twins died a few hours apart at the age of sixty-three, the first having suffered a stroke and the



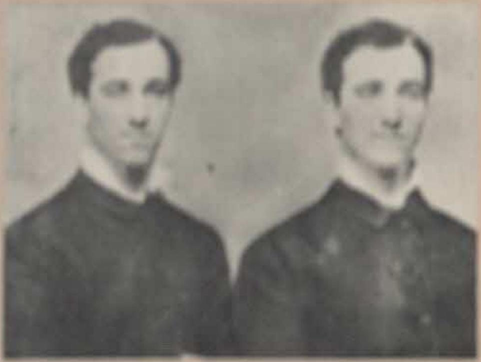
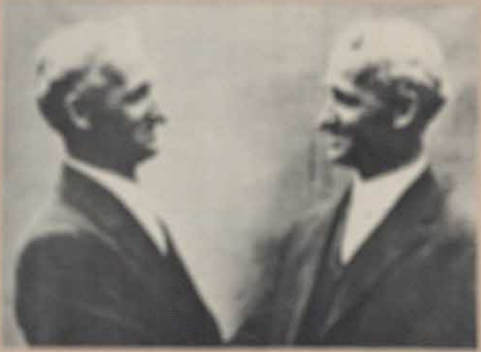


FIGURE 3–3

Photographs of a pair of *monozygotic* twins taken at ages 5, 20, 55, and 86 years. From F.J. Kallmann and L.F. Jarvik, Individual differences in constitution and genetic background. In J.E. Birren, ed., *Handbook of Aging and the Individual*, p. 241. Copyright © 1959 The University of Chicago Press. Courtesy Dr. John Rainer.



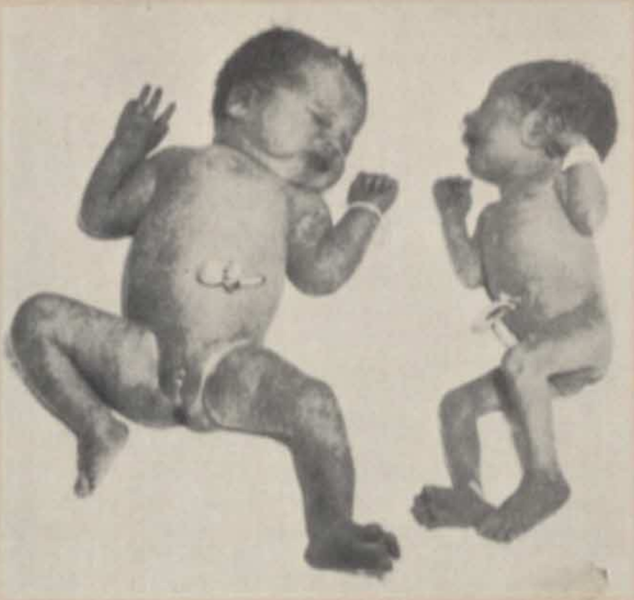


FIGURE 3-4

This photograph of a monozygotic twin pair, taken shortly after birth, shows that twins may be genetically identical and still be very dissimilar in physical appearance. Source: von Sydow and Rinne, 1958. Reproduced by permission of Acta Paediatrica Scandinavica.

second apparently dying of fear or shock. An autopsy revealed that a joining of the livers would have made separation dangerous.

How can monozygotic and dizygotic twins be differentiated? To begin with, the former but not the latter must be of the same sex. They also appear more alike (see Figure 3-3). However, overt appearance can be deceptive. For example, uterine development can result in one "identical" twin's being considerably larger and healthier than the other (see Figure 3-4). Then, too, dizygotic twins may share many identical chromosomes (as can nontwin siblings) and look similar. The presence at birth of only one placenta and one chorion is reliable evidence of monozygoism. On the other hand, two placentas, amnions, and chorions do not absolutely indicate fraternalism. Approximately 25 to 30 percent of identical twins may develop in such a manner, presumably because the fertilized zygote divides before implantation on the uterus wall and two separate implantations occur. In many instances, therefore, it is necessary to test twins further to determine the manner in which they were formed. Blood typing and skin grafting are among the best tests because monozygotic, but not dizygotic, twins have identical blood and accept each other's skin grafts.

The likelihood of a woman's actually bearing twins depends on many factors. For dizygotic twins, the age of the woman is an important variable—the probability of twins increases between twenty-five and thirty-five years of age and then declines. This pattern, though, is affected by the previous childbirth history of the woman, with the likelihood of twins being positively related to the number of previous children. Twinning can therefore be related to religious, cultural, and social factors that influence the age of childbearing and family size. Figure 3-5 shows the chances of twins for U.S. white women, according to age and childbirth history.

This figure also indicates that the likelihood of producing identical twins does not vary dramatically with age or childbirth history of the mother. Differences among racial-ethnic groups are accounted for by differences in fraternalism. In the United States, white women produce 15–20 percent fewer fraternal twins than do black women, but about the same number of identical twins. (In the world at large, the chances of twins are highest for black women, next highest for whites, and lowest for Mongolian women.)

Regardless of their racial-ethnic group, however, individual women may vary in the likelihood of producing twins. If a woman already has twins, has a sister with twins, or is herself a twin, she has a higher than average chance of bearing twin children. It is generally thought that some inherited tendencies for twinning exist that may influence such aspects as the release of ova, the division of a fertilized zygote, or the uterine environment supportive of carrying twins.

If twins are a subject of fascination, the simultaneous birth of three, four, five, and even six human babies is even more dramatic. Underlying such multiple births are both processes involved in twinning. That is several ova and sperm may unite at the same time, a fertilized zygote may divide, or both processes

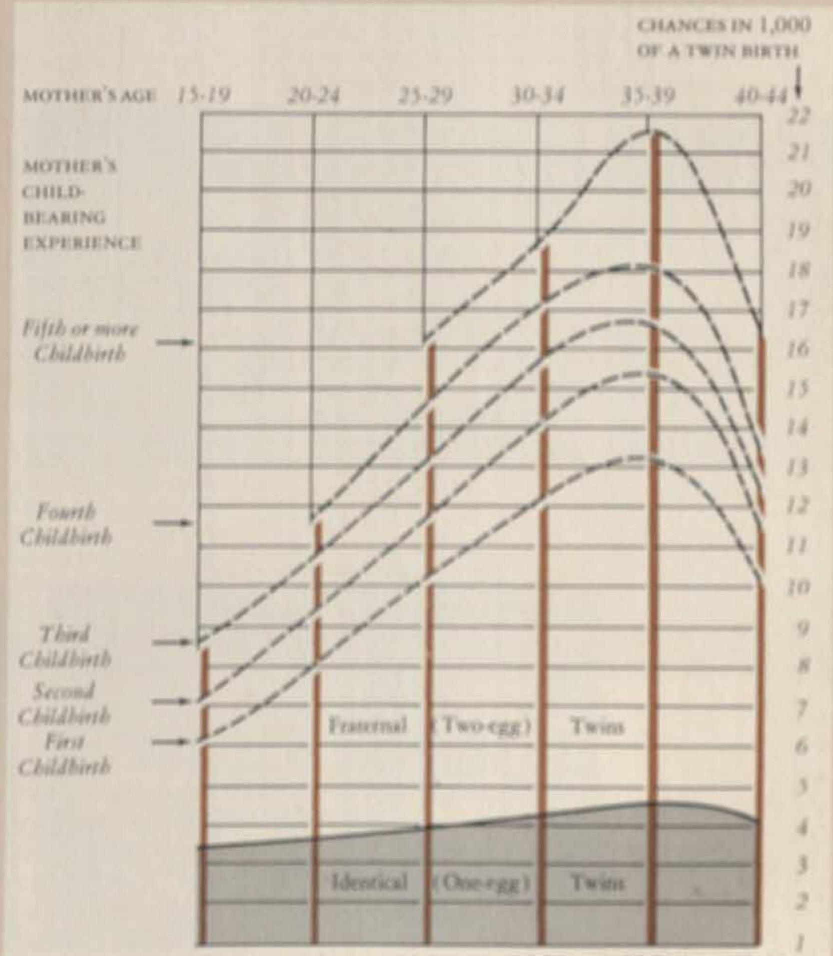
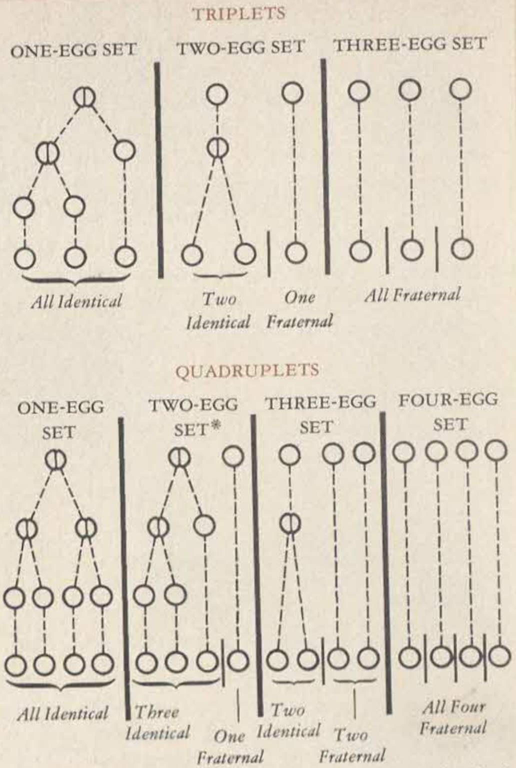


FIGURE 3-5
Chances of twinning according to the age and number of previous childbirths of the woman. The chances for fraternal twins are shown by the upper portion; chances for identical twins are shown in the lower shaded portion. For fraternal twins, the graph shows that chances of twinning are greatest for women 35–39 years old, and that the more children a woman has borne already the more likely she is to have twins. (Data for white women.) Adapted from Scheinfeld, 1973.

may occur simultaneously (See Figure 3–6). This means that a set of multiple-birth individuals may contain children all of whom are genetically identical, some of whom are identical, or none of whom are identical. The famous Dionne quintuplets, born in Canada in 1934, derived from one zygote and were therefore all identical.

As might be expected, problems during uterine life, birth, and early postnatal life are more frequent for multiple-birth children than for singles—and the more babies, the greater the risk. Providing that early development is weathered, though, such children will live relatively healthy and well-adjusted lives. This is not to say that multiple-birth children do not have experiences that differ from those of singles. They may be alike in many ways and treated with undue attention. Expectations concerning dressing the same, acting the same, and being psychologically attached will also influence their development. Psychologists have been interested in multiple births for many reasons; for example, as we shall see in Chapter 4, they have studied twins extensively in an attempt to better understand the influence of genetic composition on a variety of individual characteristics.



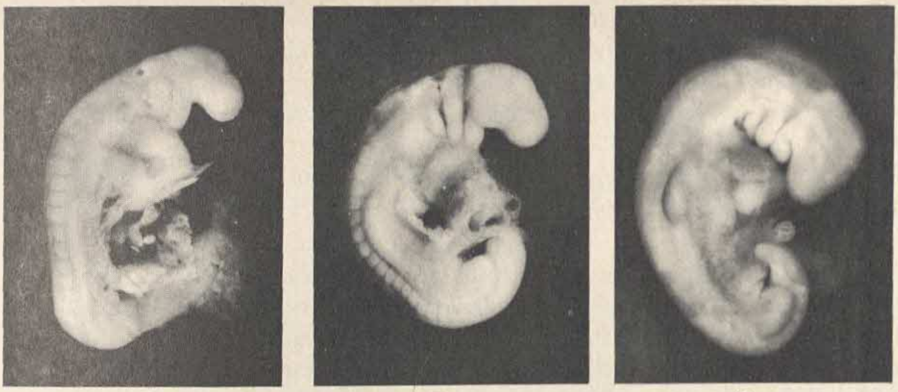
*A two-egg quadruplet set consisting of two identical pairs is also theoretically possible, but no such set has yet been found.

QUINTUPLETS

Many possible types may be produced, ranging from all five identical (a one-egg set, such as the Dionnes) to—theoretically—all fraternal (five eggs), with various combinations of identicals and fraternals in two-egg, three-egg and four-egg sets, derived through steps much as in triplet and quadruplet formation.

FIGURE 3–6
Possible ways in which triplets, quadruplets, and quintuplets may come into existence. Adapted from Scheinfeld, 1973.

Period of the embryo The two to eight weeks after implantation is known as the period of the *embryo*, and it is during this time that cellular differentiation occurs. Three layers of cells form: the *ectoderm* is the basis for the formation of skin, sense organs, and the nervous system; the *mesoderm* further differentiates into the muscles, blood, and circulatory system; and the *endoderm* gives rise to the digestive system and other internal organs and glands. By two months the embryo is about one inch long and roughly resembles a human being (see Figure 3–7). Limbs are

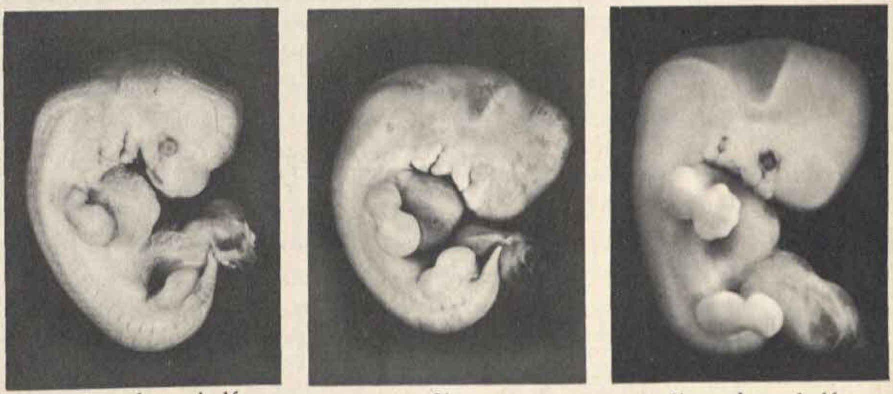


Three and one-half weeks

Four weeks

Five weeks

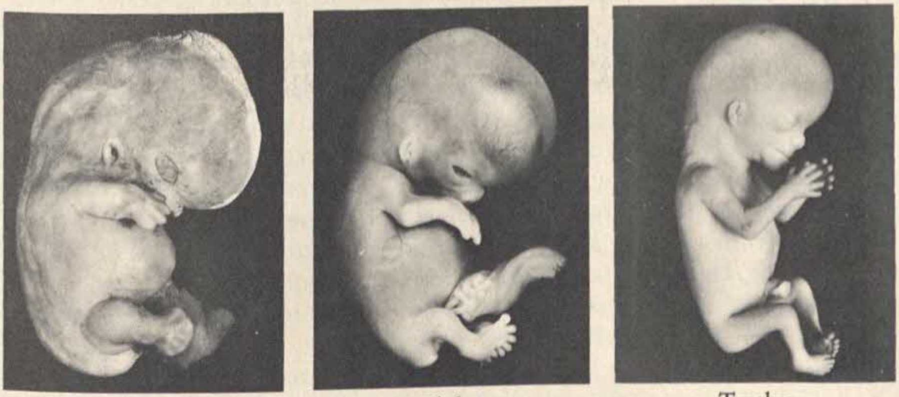
FIGURE 3–7
Development in the uterus during the first three months after conception. Courtesy A. S. Romer.



Five and one-half weeks

Six weeks

Six and one-half weeks



Seven weeks

Eight weeks

Twelve weeks

relatively well developed with fingers or toes; the face, ears, eyes, and mouth are clearly visible; the heart beats; and the nervous system shows the beginnings of a response capability.

DEVELOPMENT OF THE FETUS

From the time it is two months old, the developing organism is referred to as the *fetus*. Considerable knowledge of both the physical characteristics and the behavior of the fetus during this time has been obtained from three different sources. First, fetuses must sometimes be operatively removed from the uterus for therapeutic reasons. Although it has not yet been possible to maintain the lives of very young fetuses outside of the womb indefinitely, under well-controlled circumstances they can remain alive long enough to permit recording of both their spontaneous behavior and their reactions to certain forms of electrical and mechanical stimulation (Landreth, 1967). Second, studies can be made of premature infants (born between the sixth and eighth month after conception) which presumably reflect their behavioral capacities while in the uterus. Finally, measures of the behavior of the living fetus in the uterus may be obtained, either through the systematic reports of mothers or through the use of specialized instruments capable both of recording the behavior of the fetus and of stimulating this behavior. From these sources, researchers have been able to gain enough information to paint a reasonably complete picture of prenatal development.

The rate of growth reaches its peak during the early fetal period and then declines. Except for the differentiation of such parts as hair, nails, and external sex organs, development in the fetal period is characterized primarily by further genesis of existing structures, changes in body proportion, and increases in function. From the earliest beginnings of movement and responsive behavior in the second trimester—spontaneous movement can be felt by the mother at about sixteen weeks—to the time of birth, there is a fairly steady overall increase in activity.

In addition to quantitative change, there are some interesting qualitative changes. Kicking appears to decrease and squirming to increase as the fetus approaches birth (Newberry, 1941), and head movements show a particularly striking increase in the third trimester (Watson and Lowrey, 1954). It appears that maternal fatigue stimulates fetal activity (Schmeidler, 1941), as does the mother's cigarette smoking (Sontag and Wallace, 1935). Such increased activity, particularly when it is related to maternal stress, is associated with low birth weights and certain gastrointestinal problems at birth (Sontag, 1940; Sontag, Reynolds, and Torbet, 1944).

Reflexes, automatic and apparently innate responses, develop over an extended period and tend to appear as they become important for survival. All of the reflexes that are important for life in the uterus appear by about the fifth month (Landreth, 1967), and "advance preparation" begins during the last trimester for those functions that will be vital during the infant's postnatal existence (e.g., swallowing, urinating, muscular movements of the gastrointestinal tract). Other reflexive responses, such as the pupillary reflex, do not appear to be present even in the seven-month-old premature infant. The organism at this age will, however, respond with body movements when shown a very intense light.

INFLUENCES ON PRENATAL DEVELOPMENT

The idea that the individual developing in the uterus can be influenced by a variety of external sources is an ancient one and is represented in the old wives' tale that the pregnant woman's activities will directly determine the skills and characteristics of her child. Today few of us believe that intelligence can be influenced by the amount of reading that one's mother did during pregnancy, or that skill with needle and thread is related to the number of hours one's mother devoted to sewing. Nevertheless, there are many ways in which the developing child can be influenced by the experiences of the mother-to-be, particularly those occurring during the first three months of prenatal growth.

Inadequate nutrition can affect both physiological and psychological development and may be especially influential with regard to the growth of brain tissue (Kaplan, 1972). Experimental evidence from animal studies (Nelson, Asling, and Evans, 1952) and correlational data involving human infants who were born retarded (Knobloch and Pasamanick, 1958) indicate that deficiencies in the mother's dietary intake during the first trimester of pregnancy may have a greater effect on the young than the same deficiency occurring later in prenatal development.

The embryo is also particularly sensitive to the mother's contracting rubella (German measles) and frequently will develop into an infant that suffers mental retardation or physical abnormalities such as eye cataracts and deafness. If, however, the pregnant woman contracts the disease later, the infant typically will escape such defects.

Drugs taken by a pregnant woman can be a serious threat. A tragic example involved the drug thalidomide, a chemical that was synthesized in 1953 and at first appeared to be a harmless, sleep-inducing agent. Late in 1959, however, reports describing the malformed infants of mothers who had taken thalidomide during pregnancy began to mount. The drug caused malformation of the arms and legs; often fingers were absent and other internal organic abnormalities occurred (Carmichael, 1970). Since that incident, drugs that change the prenatal environment have been watched carefully.

Routine doses of sedation used to decrease the discomfort of the mother during labor can also affect the newborn. In the newborn visual attentiveness is suppressed (Stechler, 1964) and responsiveness to feeding decreases (Brazelton, 1961; Kron, Stein, and Goddard, 1963). The effects last as long as four days; however, whether indirect effects of early sedation influence later life is not known. There is every indication, nonetheless, that prenatal care and monitoring is important, and perhaps critical, to development.

BIRTH

Approximately 270 days after conception, the human fetus is sufficiently developed to enter the outside world. Biological preparation for *parturition*, the technical term for birth, begins with *lightening*. Toward the end of gestation, the head of the fetus turns down so that birth occurs with head first. In turn, the fetus's movement into this position relieves ("lightens") the pressure against the mother's abdomen so that she can breathe more freely. *Labor*, the process by which the fetus is expelled from its mother's womb, occurs within a few hours to a few weeks after lightening. The normal length of labor varies widely, being related to such factors as the age of the mother and the number of prior deliveries. Although the causal relationships are difficult to identify, very long labor is related to certain types of deficiencies in the physical condition of the neonate (Prechtl, 1963).

The happening of birth, as dramatic as it is, has understandably been assigned immense psychological importance. Usually it is seen as a traumatic thrust of the child from a serene and warmly protective environment into a confusing and cold world. Although it is impossible to know the psychological experiences of the newborn, we can assess birth as a biological event. We know, for instance, that for a small number of infants difficult birth (e.g., when the placenta is entangled or when instruments are required) can result in impairment or death. Even in the usual course of events some change and upheaval occurs—as in the respiratory and circulatory systems. At the same time, for at least some systems, birth appears as the natural step in a changing program of events (Tanner, 1970). For example, at about the thirty-fourth week of pregnancy there begins a gradual decrease in fetal hemoglobin in the blood and an increase in the "adult" form of this substance. These changes in blood chemistry are not influenced by birth itself. Nor does the maturation of the nervous system, as detailed by EEG recordings* and motor responses, appear to be altered by birth.

THE NEONATE

APPEARANCE

The newborn human infant,† or *neonate*, is a creature approximately twenty inches in length and usually weighing between six and nine pounds. Its appearance and posture shortly after birth are captured in Figure 3–8, a photograph taken soon after birth.

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*The EEG, or electroencephalogram, is a tracing, plotted against time, of the frequency and potential (voltage) of electrical currents emitted by the brain.

†Interestingly, the term *infant* derives from the Latin word *infans,* meaning "not speaking."

The neonate's skin is thin and dry, and it takes on a striking red and wrinkled appearance when the infant cries. In other physical aspects, the baby has a "standard" appearance which will eventually give way to the particular physical features that will characterize it in later life. Virtually all newborns appear to have flat noses, high foreheads, receding jaws (according to one upset mother, "no chin at all!"), and blue eyes. But these features will all swiftly mature and change, as will the behavioral capabilities of the young organism.

Physical condition: The Apgar score. Since the middle 1950s, one widely used method of assessing the medical condition of the infant at birth has involved the use of what is called the Apgar score, a name derived from that of its originator, Virginia Apgar. The measure is simply a rating by the pediatrician, within one minute after the infant's birth, of heart rate, respiratory efficiency, reflex irritability, muscle tone, and color. Each of these five dimensions is scored as 0, 1, or 2, with the larger numbers indicating the more superior condition of medical health. Thus an Apgar score of 10 reflects an infant with a steady heartbeat, lusty cry, and well-developed reflexes. It is often the case that neonates who are born prematurely, and this includes many multiple-birth babies, obtain lower Apgar scores than those born under more typical circumstances.

THE PREMATURELY BORN CHILD

The child who is born prematurely is, not surprisingly, subject to many more deficiencies and debilities in its later development than an infant who spends the full term of gestation in its mother's uterus. The consequences of prematurity have become increasingly important from a practical, social viewpoint as recent medical advances have ensured the survival of an increasing number of premature infants. These strides have been truly remarkable; one estimate, for example, is that mortality among premature infants was reduced by 55 percent in the United States between 1933 and 1955 (Caputo and Mandell, 1970). And as more prematures have come to survive, understanding of their deficiencies has grown.

One of the most important longitudinal studies of the relationship between birthweight and later development, initiated at Johns Hopkins University during the early 1950s, is the Baltimore Study. This investigation followed the intellectual development and school performance of almost one thousand infants, including a premature group weighing less than 3.3 pounds at birth and a normal weight group, through their twelfth year of life. (Prematurity in this study, as well as in most others, was defined by weight rather than estimates of length of uterine life.)

The study utilized sophisticated controls for a variety of factors, such as social class, race, and season and hospital of birth. Measures of intelligence taken at forty weeks of age, three to five years, six to seven years, eight to ten years, and twelve to thirteen years showed that the low-weight individuals did significantly less well than did the normal-weight ones. There were also differences in the degree of impairment within the premature group as a function of birthweight; heavier infants within the low-birthweight class were less likely to show impairment than were those of very low birthweight.

Other evidence of this relationship is found in three studies of twins (Babson, Kangas, Young, and Bramhall, 1964; Churchill, 1965; Willerman and Churchill, 1967), all suggesting that the twin with the higher birthweight tends to have the higher IQ during middle childhood. (One of the advantages of the twin study method for assessing the relationship between birthweight and intelligence is that other variables, such as socioeconomic status, parental education, and gestational age, are automatically controlled.)

The Baltimore Study was also interested in determining whether children who had been low-birthweight infants were more likely to be in special or below-grade-level school classes than were controls. It was found that while 75 percent of the control group were in an appropriate grade, only 45 percent of the smaller prematures had achieved regular school placement by the age of twelve (Wiener, 1968; Caputo and Mandell, 1970).

Many studies have shown that low birthweight is associated with an increased likelihood of physical defects and impairments, both at birth and through later life. More than half of the low-birthweight children in one sample had at least one physical or neurological impairment, including 37 percent with visual defects and 12 percent with hearing defects (Drillien, 1961). Interestingly, the incidence of defects was positively related to the year of birth; that is, children born more recently were more likely to display them. This finding presumably is a result of the increased survival rate of very low birthweight babies in recent years.

Neurological damage often has been found to be associated with low birthweight (De Hirsch, Jansky, and Langford, 1966; Lubchenco, Horner, Reed, Hix, Metcalf, Cohig, Elliott, and Bourg, 1963; Wiener, Rider, Oppel, Fischer, and Harper, 1965). These findings include evidence of strabismus (a condition in which both eyes cannot be focused on the same point, so that the individual appears to be "cross-eyed"),

FIGURE 3-8
The appearance of the neonate shortly after birth. From LIFE Science Library, *Growth*, by J. M. Tanner, G. R. Taylor, and the Editors of Time-Life Books. Photo by Lennart Nilsson. Copyright © 1965 Time Inc.

abnormal EEG recordings, and spastic movement. As with other findings already mentioned, neurological defects appear to be associated with very low birthweight rather than with relatively "heavy" prematures (Robinson and Robinson, 1965).

A relationship between low birthweight and later adjustment difficulties or problems in social behavior has been established in many correlational studies (Caputo and Mandell, 1970). Caution is needed, however, in interpreting this finding. Consider, for example, a study of Pasamanick, Rogers, and Lilienfeld (1956), in which the frequency of referrals to the Baltimore Board of Education for deviant behavior was significantly higher for low-birthweight children than for matched control children. But when only premature children who were born *without pregnancy complications* were considered, this difference disappeared. Thus the underlying factor may be pregnancy complications or events associated with them. Likewise, Robinson and Robinson (1965) reported that neither low birthweight nor very low birthweight children differed from controls in terms of teacher behavior ratings when corrections were made for social class.

Despite difficulties in identifying *causal* relationships, very low birth-

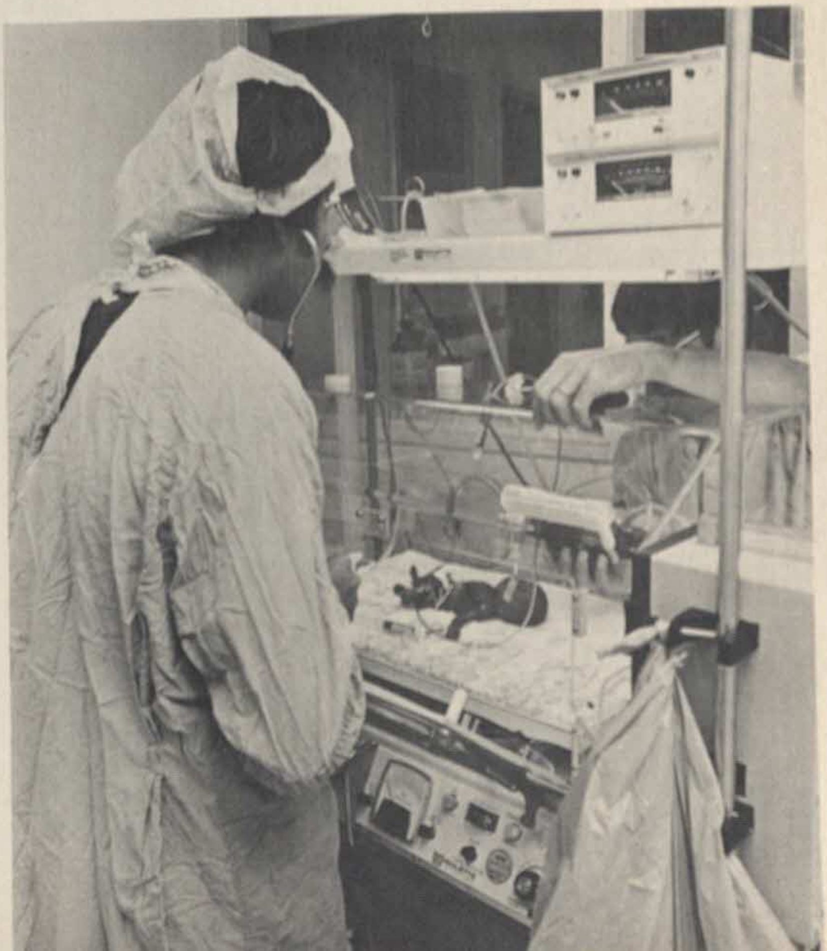

FIGURE 3–9
Premature infant in incubator, born twenty-seven weeks after conception. Photo by Mark Chester from DeWys.

weight is clearly associated with at least some difficulties in later life. Because the incidence of survival for premature infants has gone up dramatically with advances in medical and health technology, it is becoming even more important to improve psychological and educational technology to prevent or ameliorate deficiencies. Some investigators have pointed out that premature babies receive less handling after birth than do nonprematures, since they must remain relatively isolated in hospital incubators. Reasoning that this may be related to poor development, they have studied the influence of increased handling by hospital personnel or mothers. The results of these investigations provide some evidence that increased handling leads to increases in the weight and the development of premature babies (Powell, 1974; Scarr-Salapatek and Williams, 1973).

BEHAVIORAL REPERTOIRE OF THE NEONATE

One of the ways in which the neonate's behavior may be characterized is in terms of various reflexes that appear as involuntary responses to stimulation.

Among the reflexes that are clearly adaptive for the infant in its new environment are those involving *breathing, blinking,* and *coughing* or *sneezing* in response to an irritant, and three reflexes, *rooting, sucking,* and *swallowing,* which are related to feeding. The rooting reflex manifests itself in the fact that stimulation to the cheek of the neonate will cause it to turn its head and mouth toward the direction of that stimulation.

At least four other reflexes exist which appear to have no obvious functional significance, although they may have been adaptive earlier in our evolution. The palmar or *grasp reflex* can be seen in the infant's tendency to firmly grasp a rod or finger that is placed in its palm, sometimes with enough strength to actually suspend its own weight. The plantar or *Babinski reflex* appears as a fanning out of the toes upon stimulation of the sole of the foot. The *swimming reflex,* as the name implies, consists of swimminglike movements of the arms and legs which an infant makes when placed in water. Finally, the *Moro reflex* is manifested in the infant's response to loss of support or intense stimulation such as a loud noise. As can be seen in Figure 3–10, it consists of arching the back, throwing back the head, and extending the arms outward from the body. All four of these reflexes disappear within the first year of life. They are, nevertheless, important in that they can signify whether development is proceeding in a typical or an atypical fashion.

Other behavior exhibited by newborns includes movements of the eyelids and eyes, and grimacing to the introduction of salty solutions and quinine into the mouth. Thus the neonate immediately reacts to the environment and displays rapid growth in the behavioral repertoire. For example, Shirley (1933), studying the development of visual ability, found that more than half of a sample of twenty-five infants could (1) follow a light with their eyes by the end of the first week after birth,

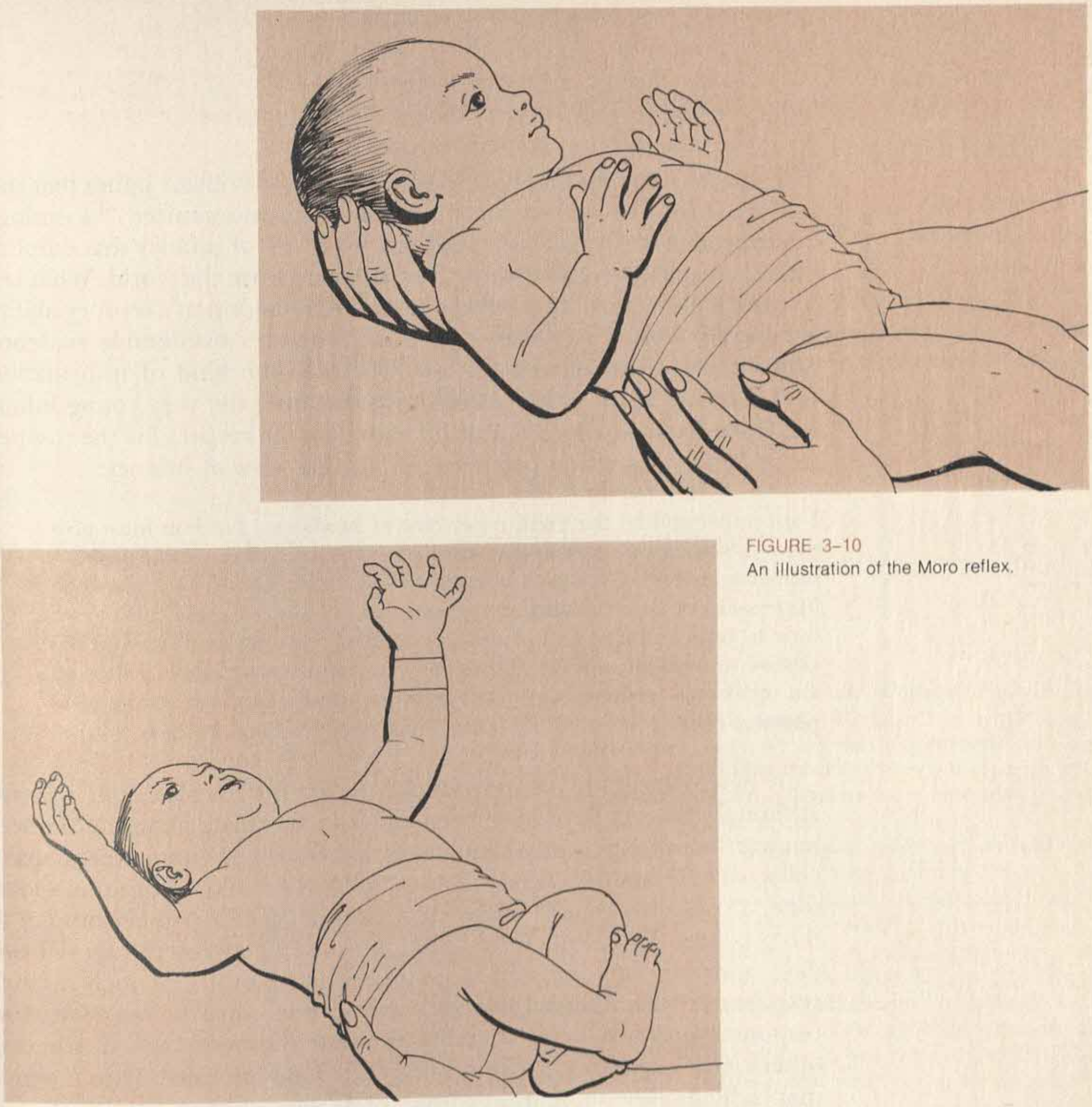

FIGURE 3–10
An illustration of the Moro reflex.

(2) fix their eyes on an object by three weeks of age, and (3) visually follow a horizontally moving object by nine weeks. Much of the young infant's activity involves generalized movements of many parts of the body. When crying occurs, the entire organism, including arms and legs, appears to be involved; this diffuse or mass activity involving seemingly irrelevant movement can be elicited by a variety of stimuli. One explanation for this behavior, which decreases during the first year of life, is a lack of inhibitory mechanisms in the immature nervous system (Wolff, 1966).

THE INFANT AS A COMPETENT INDIVIDUAL

The view held by the late American psychologist William James that the world of the infant is nothing more than an unorganized "blooming, buzzing confusion" has been replaced by a view of infancy that emphasizes the capability of the young human to organize the world. What led to this change? First, the old assumption that the infant's sensory ability is severely limited has been discarded. Second, considerable evidence now indicates that infants are selective as to the kind of information they take in. Third, it has been shown that even the very young infant can learn from experience. Prechtl expresses the respect for the competence of the infant that pervades our current view of infancy:

> I am impressed by the great repertoire of newborns, but you must give them the chance to show it. If you put a newborn baby in a supine position in its cot and cover it with a blanket up to its neck, of course it gives the impression of being a kind of vegetable which just cries and sucks from time to time and that's all. But if, for example, you watch a baby on the skin of its mother, without clothes but at a warm temperature, it shows a lot of things: rooting, crawling, grasping, and numerous anti-gravity postural responses. [cited in Stone, Smith, and Murphy, 1973, p. 240]

A new respect for the individuality of infants has also been evident. Although parents have long been eager to speculate about differences among babies, scientists, cautious by professional commitment, have collected relevant data slowly. Birns (1965) presented a soft tone, a loud tone, a cold disk applied to the thigh, and a pacifier (rubber nipple) to thirty babies. The babies were tested four times between the ages of two days and five days. Observers recorded the intensity of each infant's response to the stimulation. Birns found that some babies tended to respond vigorously to all stimuli every time they were tested, whereas others gave responses of quite consistently mild intensity. Thus it seems that individuality is apparent within a few days of birth.

Brown (1964) observed six infants during the first week of life, each day for about an hour after feeding. The infants tended to show considerable individuality and consistency in their behavior. One child, Dorothy, slept quite a bit (37% of the time), cried a lot (39%), and was rarely alert (4%). She hardly reacted to the stimulation used by the experimenter to test sensitivity. Ted slept a great deal (56% of the time) and cried very little (17%). Most of his activity seemed directed at decreasing tension and returning to sleep. Charles was alert, quiet, and receptive (37% of the time). He slept a good deal but was able to remain quietly awake for long periods of time. External stimulation often led to an increase in tension for him. Which infant took in the most from the environment—Dorothy, Ted, or Charles? Most people would probably point to Charles, assuming that a quiet, alert state is the best for taking in information, an assumption that has been defended by Escalona (1968). Thus, it seems that shortly after birth infants differ not only in the vigor of their activity and in the proportion of their day spent in various activities but also in their receptiveness to information (Stone, Smith, and Murphy, 1973).

Fascinating evidence of individuality in infancy has been provided by H. R. Schaffer and Peggy Emerson (1964b). They found that while some infants seek physical contact (being held, kissed, carried, etc.), others try to avoid such contact. They called children falling into the former category "cuddlers" and those falling into the latter "non-cuddlers." In Selection 2, Schaffer and Emerson present their research comparing cuddlers with non-cuddlers.

SELECTION 2

PATTERNS OF RESPONSE TO PHYSICAL CONTACT IN EARLY HUMAN DEVELOPMENT

H. R. Schaffer and Peggy E. Emerson

It has long been assumed that physical contact plays an important part in early human development and that all normal infants actively seek and enjoy this mode of interaction with their social environment. . . . Some material bearing on this problem arose in the course of a longitudinal investigation concerned with the formation of social attachments in infancy (Schaffer, 1963, Schaffer and Emerson, 1964a). While carrying out this study it was noted that not all infants eagerly seek physical contact . . . a considerable proportion of the subjects actively resisted and protested at certain types of such interaction. . . .

PROCEDURE

The sample from which data concerning reactions to physical contact were obtained comprised 37 infants, mostly from working-class families, living in their own homes and of normal developmental status. Contact with the families was, in the first place, made through a Child Welfare Clinic in the early weeks of the infant's first year. Once the mother's agreement to participate in the project had been obtained, all subsequent interviews took place in the family's home. . . .

While casual observations and reports concerning the infants' reactions to various forms of physical contact had been gathered . . . the data to be presented here are based on the mother's answers to an interview schedule specifically concerned with this aspect. The schedule was administered at two points: at the end of the infant's first year (in order to obtain information about the whole of the first twelve months) and again at eighteen months (to cover behaviour in the preceding six months). The questions in the schedule dealt with the following aspects:

1. the infant's behaviour in a number of commonly occurring contact situations, such as being cuddled, carried, held on lap, stroked, kissed, fed on knee, and swung or bounced;
2. the consistency of these reactions with age, person offering

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the contact, and the infant's internal condition (i.e., the effect of pain, illness, fatigue or fear);

3. evidence for contact-seeking in relation to inanimate objects or the self;
4. the mother's behaviour in contact situations and her reactions to any contact avoidance on the infant's part.

Though guided by the schedule, interviews assumed a largely unstructured form, the mothers being encouraged to give as free and full a description of the infant's reactions in the relevant situation as possible. These descriptions were frequently illustrated by spontaneous demonstrations which the mothers enacted with the infant before the interviewer. . . .

For the sake of clarity of presentation we shall only be concerned here with the "pure" cases, i.e., the "Cuddlers" and the "Non-Cuddlers," and describe our findings in terms of the contrast between these two groups. . . .

To illustrate the difference between the two groups, the following phrases may be quoted from the reports given by the mothers of the Non-Cuddlers regarding the infant's reaction to cuddling, i.e., that form of physical contact where the baby is picked up, held with both arms in an upright position on the adult's lap, pressed against her shoulder and usually given some skin-to-skin contact such as kissing or cheek stroking:

"Gets restless when cuddled, turns face away and begins to struggle."

"Will not allow it, fights to get away."

"Has never liked this since able to struggle, squirms and whimpers."

"Gets restless, pushes you away."

"Wriggles and arches back, and only stops when put down again."

"Restless and whiny until allowed back in cot."

"Will kick and thrash with his arms, and if you persist will begin to cry."

These phrases may be contrasted with the following from the mothers of the Cuddlers:

"Cuddles you back."

"Snuggles into you."

"Holds quite still and puts on a soppy face."

"Loves it."

"Laps it up."

"Would let me cuddle him for hours on end." . . .

In general, diversion techniques such as walking or carrying the child around, playing with him, or giving him a biscuit or a bottle were found to be the most effective means of dealing with the Non-Cuddlers when ill or in pain. This does not mean that this group of infants showed a lack of orientation towards the mother: she was still regarded as a "haven of safety" and when frightened (as, for instance, by the approach of a stranger) the Non-Cuddlers too sought her proximity. Their means of establishing proximity was, however, different, for instead of the close physical contact which the other infants sought for reassurance, the Non-Cuddlers either made visual contact with the mother by looking away from the frightening object and turning towards her, or established a much less close physical contact such as holding on to the mother's skirt or hiding their face against her knee. . . .

From the above descriptions it can be seen that, while marked differences exist between the Cuddlers and the Non-Cuddlers, the latter do not by any means resist *all* forms of physical contact. Their protests, it appears, are elicited only by those types of interaction which involve a *close* physical contact, as seen at its clearest in the cuddling situation. Skin contact alone, such as occurs when the child is kissed or has his face stroked without being picked up, when he is tickled, or when "skin games" are played with him, failed to differentiate the two groups, for none of the infants was reported as avoiding or protesting at these forms of interaction. Handling also does not appear to be the crucial factor: the Non-Cuddlers not only tolerated but actively enjoyed being swung, bounced, danced around or romped with, in any way which involved contact but not restraint. As soon as restraint was applied, however, i.e., the infant was not merely supported but also had his movements actively restricted, struggling and resistance occurred.

We must conclude, therefore, that it is not contact *per se* that is avoided by the Non-Cuddlers but only the restriction of movement that is involved in certain of the contact situations. However, because of their resistance in situations in which contact tends to be most commonly offered, the total amount of physical contact obtained by the Non-Cuddlers is likely to be considerably reduced in comparison with the Cuddlers. . . .

On the basis partly of observations of casual interaction sequences between mother and child taking place during interviews, and partly of reports from the mothers as to the method of dealing with the child's demands for attention, each mother was allocated by two judges, who had read through all the relevant material gathered in the course of the project, according to her *preferred* mode of interaction with the infant to one of three categories: personal-handling (interaction takes place mainly through physical contact), personal non-handling (stimulation is provided by the mother mainly through visual and auditory means), and impersonal (toys, food, etc., are used to "divert" the child's demands for attention away from the mother herself). Combining the last two categories as representing Non-Handlers and comparing them with the first category the Handlers, the distribution for the two contact groups is as given in Table 1. These figures provide no support for the hypothesis that contact type is a direct function of the mother's customary mode of handling: though most of the Non-Cuddlers had mothers who preferred other than physical means of interaction, the prevalence of non-handling mothers amongst the Cuddlers suggests that this variable cannot, in itself, be regarded as the crucial aetiological condition.

TABLE 1
ASSOCIATION OF MATERNAL HANDLING TYPE WITH CONTACT GROUP

	MATERNAL TYPES	
	Handlers	*Non-Handlers*
"Cuddlers"	9	10
"Non-Cuddlers"	2	7

$p > 0.10$, Fisher exact test.

Table 1 does, however, raise the interesting problem of non-matching couples. Pursuing this point in interview, it was found that the Cuddlers with non-handling mothers obtained the desired contact comfort either from other members of the family or occasionally from the mother herself, in that the latter found that she just had to give way to the infant's demands from time to time. Complete rigidity and utter failure to bring about mutual adjustment was therefore not observed in this group. The same applies to the Non-Cuddlers with handling mothers: although this situation might well be the first step in the development of a pathological relationship, in this sample the mothers were able to adjust to the infant's peculiarities and relate to him by using alternate modes of interaction. . . .

As to other people, it was reported by all mothers of the Non-Cuddlers that the infant behaved similarly with everybody. While we have no way of confirming the veracity of this statement, casual observations during interviews produced no contradictory evidence. Some of the mothers indeed mentioned their embarrassment when doting relatives and other visitors would attempt to cuddle an otherwise friendly child and be confronted with a violently negative reaction on his part. . . .

It is possible . . . that the two contact groups may be differentiated on some such basis as the congenital activity types described by Fries [and Woolf] (1953). Hyperactive, restless infants would be more likely to resist those forms of physical contact which involve restraint of their movements, and it is this element which, as we have seen, appears to be the crucial one in calling forth their protests in the cuddling situation. We attempted further to pinpoint this difference in reaction to restraint by asking about the infants' behaviour in relation to two other situations also involving motor restraint: being dressed and being tucked into bed (see Table 2). In both instances a clear difference is shown between the contact groups when mothers were asked whether or not the child had consistently protested in the relevant situation from the age of at least six months on: thus the Non-Cuddlers are far more often reported as showing dislike of being wrapped, changed, or having their clothes put on than the Cuddlers, and the same difference also emerges for behaviour in bed in that struggling when tucked into bed, kicking off blankets, and general restlessness when actually asleep were characteristics found to a significantly greater extent amongst the Non-Cuddlers than the Cuddlers. Even the actual amount of sleep differentiates the two groups: when asked to detail the number of hours which the infants spent asleep per 24 hr. (the infants being 9–10 months old at the time this information was sought), the mothers of the Non-Cuddlers reported a mean value of 11.89 hr. as compared with the 13.16 hr. reported by the mothers of the Cuddlers ($t = 4.12$, $p < 0.001$).

The restlessness of the Non-Cuddlers appears to have one further consequence. . . . In their motor development these infants appear to be well ahead of the Cuddlers, reaching such milestones as the ability to sit unsupported, to stand holding on, and to crawl, considerably sooner than the Cuddlers. . . . The Cattell Infant Scale (Cattell, 1940) was administered to all infants around the age of 6 months and here too a significant difference was obtained between Cuddlers and Non-Cuddlers. As the items composing the test around this age are mainly concerned with motor, particularly manipulative, functioning, further confirmation is given to the association between contact type and early locomotor development. The Non-Cuddlers' restlessness thus appears to provide a drive to motor functioning which results in increased achievement in this sphere when compared with the more placid infants of the Cuddler group.

We may conclude that the Non-Cuddlers' avoidance of close physical contact is concerned with a phenomenon that is not peculiar to the relationship with the mother or indeed to social relationships in general. These children, it appears, were distinguished by a general behavioural characteristic affecting a wide range of functions and apparent in non-social as well as social situations. . . .

TABLE 2
REACTIONS OF CONTACT GROUPS IN TWO RESTRAINT SITUATIONS—DRESSED AND TUCKED INTO BED

	DRESSED		TUCKED INTO BED	
	Protest	*No Protest*	*Protest*	*No Protest*
"Cuddlers"	3	16	2	17
"Non-Cuddlers"	6	3	5	4
p^*	0.05		0.05	

*Fisher exact test.

Because newborn infants have had little opportunity to be shaped by life experiences, differences among infants are usually attributed to either differences in their prenatal environment or differences in their inheritance. Schaffer and Emerson (1964) are inclined to attribute "cuddliness" to inheritance, but their hunch is difficult to test. (A more detailed discussion of testing for inherited differences among infants will be presented in Chapter 4.)

PATTERNS OF PHYSICAL GROWTH

As even casual observation reveals, the first two or three years of life are a period of very rapid growth for the human organism. The question for researchers has been twofold: (1) to identify general principles that can adequately characterize and summarize growth; and (2) to collect normative data regarding the development of particular body parts and functions.

MAJOR PERIODS OF GROWTH

Viewed in its larger perspective, bodily growth occurs through approximately the first twenty years of life in humans. It is generally felt to be fruitful to divide this overall growth period into three major subdivisions—infancy and early childhood (up to about the fifth year of life), middle and late childhood (up to about age twelve), and adolescence (up to about age twenty). Growth is more rapid and more likely to show spurts during both the infancy–early childhood period and the adolescent period than during middle childhood.

SYSTEMS OF GROWTH

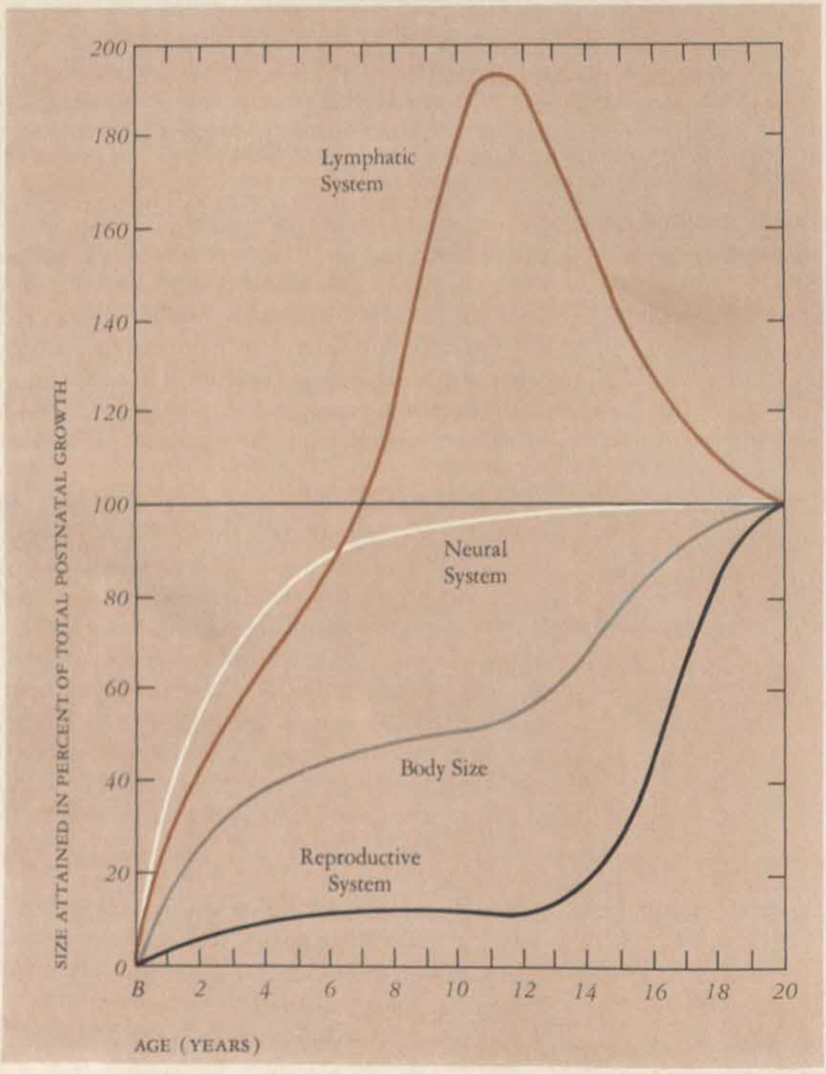
Different parts of the body show somewhat different growth patterns relative to the age of the child. Various organ systems or tissues and their growth curves are represented in Figure 3–11. The *body size* category, which includes the skeleton, muscles, and internal organs, shows more rapid growth during the infancy–early childhood period and the adolescent period than during middle childhood. The *lymphatic system* (thymus, lymph nodes, and intestinal lymphoid mass) reaches an adult level by seven years of age and is even larger during preadolescence before it declines. Similarly, the *neural system* (head, brain, and spinal cord) is almost fully developed by the age of six. In contrast, the *reproductive organs* grow very slowly until adolescence, at which point they undergo rapid growth.

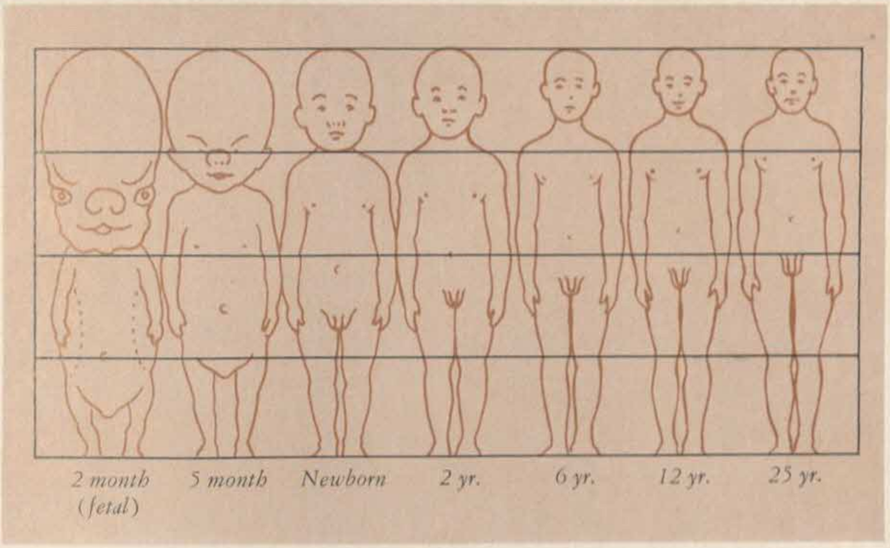
GENERAL PRINCIPLES

It has often been noted that early development proceeds *cephalocaudally* —that is, from the cephalic or head region to the caudal or tail region. Thus, as seen in Figure 3–12, the appearance of the fetus is remarkably top-heavy and the neonate's less so; not until middle adolescence are the proportions of adulthood fully apparent. The functioning of the organism appears in keeping with this direction of physical growth. Infants are able to lift their heads within the first weeks of life but cannot stand until the end of the first year.

A second general principle of development is that growth proceeds from the proximal or center axis of the body to the extremities or more distal regions. Not surprisingly, this *proximodistal* pattern of physical growth is also reflected in the youngster's behavioral competence. The infant moves its entire upper body in order to orient its hands when grasping an object, and only later becomes able to move the arms and hands independently. It is even later before the infant can execute relatively refined finger movements.

FIGURE 3-11
Varying patterns of development for the four systems of growth. Adapted from J. M. Tanner, Physical growth. In P. H. Mussen, ed., *Carmichael's Manual of Child Psychology*, 3rd ed., Vol. 1. Copyright 1970, reproduced by permission of John Wiley & Sons, Inc.





2 month (fetal)
5 month
Newborn
2 yr.
6 yr.
12 yr.
25 yr.

FIGURE 3–12
Changes in body form associated with age. Adapted from C. M. Jackson, Some aspects of form and growth. In W. J. Robbins et al., *Growth*. New Haven: Yale University Press, 1929, p. 118, by permission.

RATE OF PHYSICAL GROWTH

One of the most intriguing facets of body growth is that there are large individual differences in the *rate* at which growth occurs. This fact has potentially important implications for the development of social behavior.

Tanner (1963) has suggested that each individual displays a biologically determined natural growth curve. Evidence for such an argument comes from a number of different sources. First, the correlation between an individual's body length at two years old and in adulthood is approximately +.80, which, as we saw in Chapter 2, is quite high indeed. Second, Tanner notes that when children have been impeded from normal growth for a period of time, they often appear to "catch up" or make up for the loss when the impeding factor is removed.

> The most striking and perhaps most fundamental characteristic of the growth of an animal is that it is self-stabilizing, or, to take another analogy, "target-seeking." Children, no less than rockets, have their trajectories, governed by the control systems of their genetical constitution and powered by energy absorbed from the natural environment. Deflect the child from its natural growth trajectory by acute malnutrition or a sudden lack of a hormone and a restoring force develops so that as soon as the missing food or hormone is supplied again the child catches up towards its original curve. When it gets there, it slows down to adjust its path onto the old trajectory once more. [Tanner, 1963, p. 818]

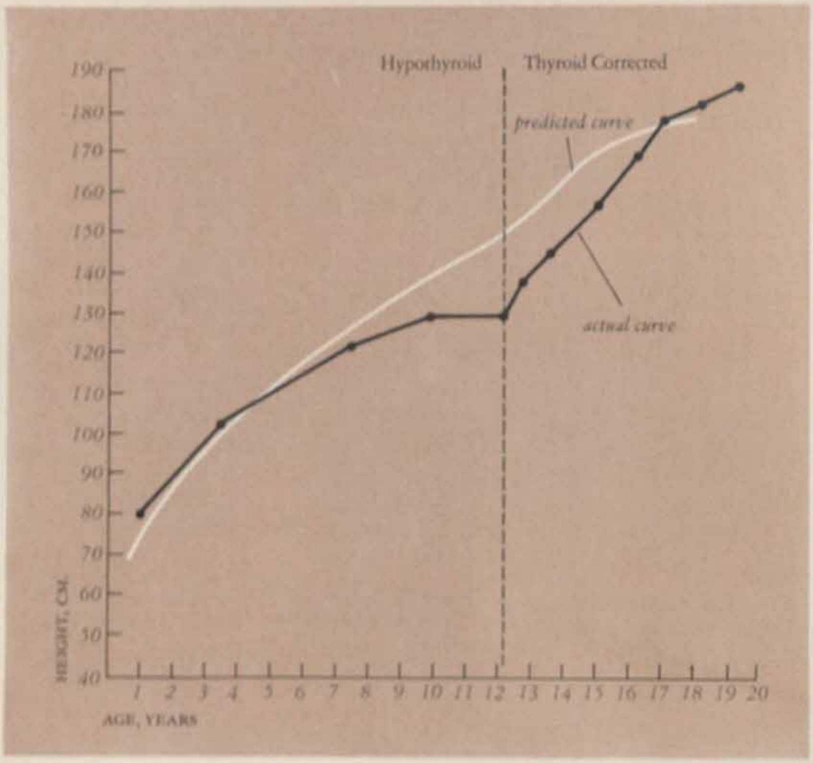


FIGURE 3–13
The rate of growth of a boy suffering from hypothyroidism, both before and after treatment. Note how he "caught up" with the normal growth rate. Adapted from J. M. Tanner, The regulation of human growth. *Child Development*, 1963, 34, 825, figure 5. Copyright 1963 by the Society for Research in Child Development, Inc. Reproduced by permission.

The evidence for such predetermined growth patterns is illustrated in the case cited by Tanner of a boy suffering from hypothyroidism. (*Hypothyroidism* is a deficiency in the activity of the thyroid gland, which decreases the amount of thyroxine, a growth-regulating hormone produced by the gland.) The lad's growth virtually ceased from the age of eight to the age of twelve, although, as seen in Figure 3–13, he showed a rate of growth that was almost exactly average until then. When appropriate treatment was given for the glandular condition, growth not only resumed but showed an unusually rapid acceleration so that he quickly "caught up" with the growth rate that would have been predicted from his height at ages one through four.

MOTOR DEVELOPMENT

As the child grows physically, his or her ability to manipulate the environment also shows rapid growth. This type of motor accomplishment, is often referred to as perceptual-motor development because it involves many complex perceptual and cognitive processes that will be discussed in later chapters. For now, though, we can begin with a description of this early development and of some of the general principles that characterize it.

PRINCIPLES AND ISSUES

Two general principles of motor development, closely related to one another, are *differentiation* and *hierarchic integration*. The term *differentiation* refers to the fact that the child's physical development is characterized by an increasing degree of control and specificity in its motor functions. Very young infants quickly begin to manifest growing motor coordination; first they show good control over arm movements, then hand movements, and finally finger movements. Along with this increase in coordination comes increasing differentiation in the control that children exercise over their bodies. The many individual movements over which the child gains mastery are then "put together" or integrated into more complex and sophisticated patterns of behavior. This process, which Heinz Werner (1948) has called "hierarchic integration," implies that individual parts of the child's new motor competence are integrated into larger and more coherent whole units of motor behavior. After gaining greater and greater control over arm, leg, and neck movements (differentiation), the infant will begin to put these differentiated but relatively simple actions together and perform the more complex and integrated act of sitting up without support (hierarchic integration).

Maturation and experience

To what extent, though, is the type of development described above simply a function of bodily maturation and to what extent does it rely on experience? The question has continually woven itself into the inquiries of developmental psychologists (see Chapter 1). Maturation, it will be recalled, refers to those changes that primarily represent an unfolding of the nature of the capacities of the organism (and the species) that are at least relatively independent of special environmental circumstances, training, or experience. One psychological dictionary defines *maturation* as referring to those changes "that take place more or less inevitably in all normal members of the species so long as they are provided with an environment suitable to the species" (English and English, 1958).

A classical experiment demonstrating maturational processes in motor development was conducted by Carmichael in the late 1920s. Working with the salamander *Amblystoma*, he divided the animals into a control group and an experimental group. The latter were placed in water containing an anesthetic; the control animals were allowed to develop in fresh water. In time, the control salamanders began to show vigorous movement, whereas those in the anesthetic were immobile. But when the drugged animals were then placed in fresh water, they immediately began to swim. Within half an hour they were indistinguishable from the controls that had been swimming for five days

(Carmichael, 1970). Although other similar experiments have not shown such clear effects, this study serves to strengthen belief in built-in processes which operate independently of experience.

A few early investigations addressed to the maturation-experience issue involved human infants. Dennis and Dennis (1940) collected information about Hopi Indian children concerning the development of walking. Traditionally reared Hopi infants were secured to cradle boards in such a way that they were unable to move their hands, roll over, or raise their bodies. The babies were removed from the cradle boards only once or twice a day to have their clothes changed. But other Hopi infants, their parents being influenced by European ways, were not restricted in this manner. Dennis and Dennis were thus able to examine the effect of naturally occurring events and found that infants in *both* groups walked at about fifteen months.

Gesell and Thompson (1929) similarly studied stair climbing in a pair of identical twins. One twin (T) was trained to climb stairs at forty-six weeks of age and was provided practice in the activity until she was fifty-two weeks old. At this time she was able to climb the stairs alone in twenty-six seconds. The control twin (C) received no training and at fifty-three weeks could climb the stairs in forty-six seconds, but two weeks later she accomplished the task in ten seconds.

Taken together, these studies provided evidence that maturation is largely responsible for the development of the new behaviors involved, a conclusion that has theoretical and practical implications. But the conclusion must be assessed carefully. As Bower (1974) has pointed out, we do not actually understand the antecedents of developing behavior and so infants who receive training and practice for a particular behavior may not receive *relevant* training. In the Gesell and Thompson study, for example, twin T was trained by being passively moved up and down the stairs, but perhaps a more reasonable training would have involved crawling on the floor (which, in fact, twin C might have done). But even given the assumption that maturation is important in the development of motor behavior, it is not valid to conclude, as is often done, that teaching a child before he or she is "ready" is a waste of time and effort. Biological readiness does not ensure the blooming of behavior, and optimal achievement undoubtedly requires appropriate learning opportunities at the time of maximum readiness.

Norms: a word of caution In much of what follows we will be citing norms or averages regarding motor development and, in later chapters, will have occasion to mention similar norms regarding intellectual and social skills. Although this procedure helps us to define groups adequately and thus to understand the approximate rate and nature of human development, it cannot be emphasized too strongly that it is unwise to apply group averages uncritically to any one individual case. Williams (1946) has likened the problem to one of determining the

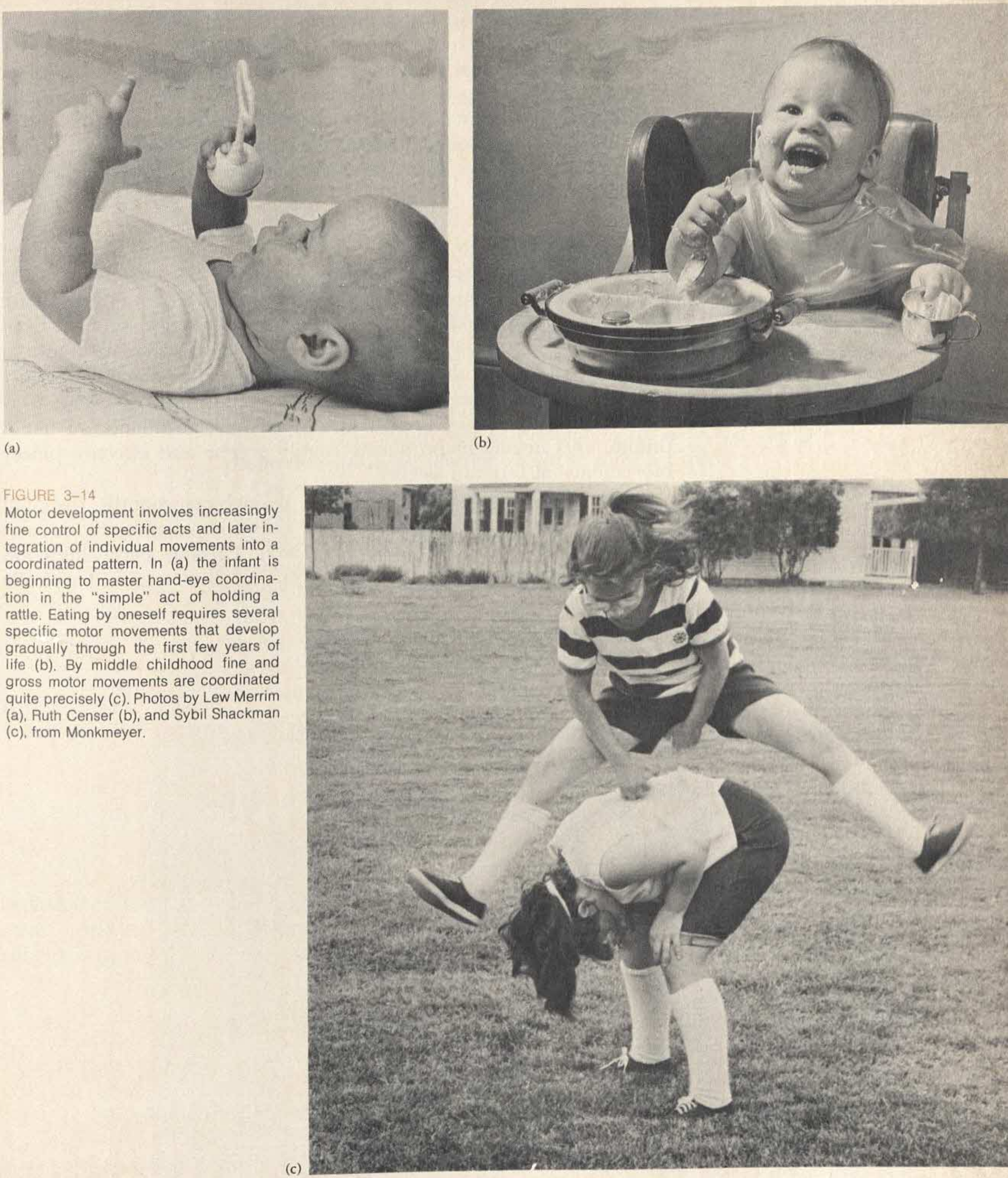


FIGURE 3–14
Motor development involves increasingly fine control of specific acts and later integration of individual movements into a coordinated pattern. In (a) the infant is beginning to master hand-eye coordination in the "simple" act of holding a rattle. Eating by oneself requires several specific motor movements that develop gradually through the first few years of life (b). By middle childhood fine and gross motor movements are coordinated quite precisely (c). Photos by Lew Merrim (a), Ruth Censer (b), and Sybil Shackman (c), from Monkmeyer.

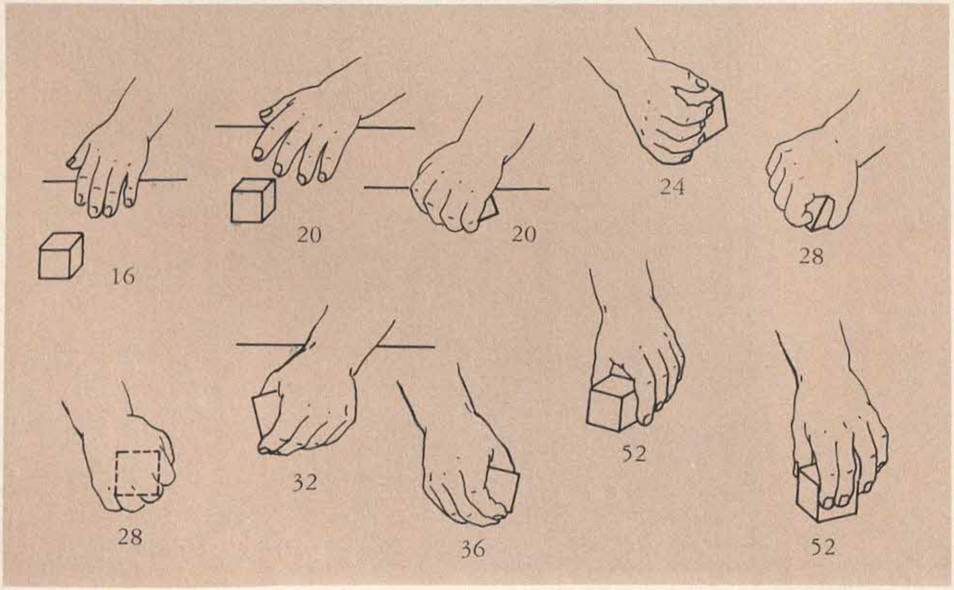
average shoe size in an army. Having such information would, of course, be of enormous value in determining the quantity of leather we would need to outfit the army in shoes. It would not, however, be of any value whatsoever in helping us to determine the particular sizes that should actually be ordered or made. It would be completely ludicrous to try to outfit the entire group with average-size shoes, which would, in fact, actually be suitable for very few individuals and conceivably might not fit anyone at all.

DEVELOPMENT OF MANUAL SKILLS

The child's ability to manually handle objects in the environment proceeds through a series of orderly stages that illustrate most of the principles discussed in the preceding section. Halverson (1931, 1936), for example, identified a series of stages in manual development from film records of neonates and infants. These stages, which are shown in Figure 3–15, range from simply touching and holding objects (at twenty weeks) to the increasingly sophisticated use of the fingers (at twenty-four to thirty-six weeks) and then to the successful coordination of hand, thumb, and fingers in producing highly precise and effective pincer movements (at fifty-two weeks).

Later changes are equally dramatic. By eighteen months, the child can typically fill a cup with cubes, build a tower from three blocks, and turn the pages of a book (Landreth, 1967). Through early childhood these accomplishments continue to advance; a four-year-old typically

Figure 3–15
The development of manual skills during the first year of life. The numbers indicate the age of the child in weeks, while the hands illustrate the growth in manual dexterity that occurs. Adapted from H. M. Halverson, 1931. By permission.



can fold paper diagonally and produce simple figures like a cross; at five years, the youngster can usually

> . . . pluck a dozen pellets one by one and drop them deftly into a bottle in about 20 seconds, typically with a preferred hand. . . . [The five-year-old] wields a crayon with greater assurance and definitiveness. He draws a recognizable man. . . . He has difficulty with the obliques required in the copying of a diamond, but he is quite equal to copying a square and a triangle. [Gesell, Halverson, Thompson, Ilg, Castner, Ames, and Amatruda, 1940, p. 53]

The appearance of laterality (handedness) The synonymous terms *laterality* and *handedness* refer to the fact that, with rare exceptions, adults show a clear preference for the use of one hand over the other. Although the preference is not absolutely consistent across activities (i.e., some people may write with their right hand but eat with their left), there is a remarkable consistency across cultures. Between 90 and 95 percent of the adult human population all over the world show a preference for using the right hand in most activities.

The difference in preference for one hand over the other appears in the latter part of the first year of life. At that time at least 15 percent of the population display preference for the left hand. The percentage becomes smaller as individuals reach adulthood and some shift to right-handedness. Several other interesting facts are associated with laterality. One is that some other primates (e.g., rhesus monkeys) are about equally likely to be left- or right-handed in their manual preferences. Relatively few people are truly ambidextrous, in the sense that they are equally comfortable in using either hand.

The development of handedness is not, however, an immediate all-or-none event. It involves a complex shifting back and forth from bilaterality (using either hand) to unilaterality (with either the right or left hand predominant). It is not until about four years of age that most children stabilize at using the right hand for most activities. (Gesell and Ames, 1947)

INTEGRATED MOTOR ACTS: SOME MILESTONES

Through the first two years of life the child's increasing physical growth and competence is reflected in a variety of milestone activities. As the reader may recall from Figure 1-2 in Chapter 1, Shirley (1933) observed a regular growth associated with age in the development of skills related to crawling, climbing, and walking. Other age-exemplary accomplishments related to motor development are shown in Table 3-1.

Although many of the biological changes discussed above characterize the entire human species, some, such as rate of maturing, reveal wide individual differences among persons. These differences appear to be determined, in part, by the child's unique hereditary endowment. It is to genetic determinants of behavior and development that we turn our attention in the next chapter.

TABLE 3–1
SOME MILESTONE ACCOMPLISHMENTS DURING THE FIRST TWO YEARS

AGE (MONTHS)	ACCOMPLISHMENT	AGE (MONTHS)	ACCOMPLISHMENT
3	Can support its own head when in prone position	10	Can creep; pull self to a standing position
4	Can shake a rattle; head is self-supported	12	Can walk when held by one hand; seat self on floor
6	Can sit, stand when held, and reach effectively	18	Can walk by self, although with a "stiff" gait; crawl down stairs backward
8	Can stand holding on and grasp with thumb opposition	24	Runs; climbs up and down stairs; can alternate rapidly between sitting and standing

Source: Adapted from E. H. Lenneberg, *Biological foundations of language*. New York: John Wiley & Sons, Inc., 1967. Copyright 1967, reproduced by permission of John Wiley & Sons, Inc.

SUMMARY

Human development begins with conception when the female reproductive cell, the *ovum*, and its male counterpart, the *spermatozoan*, join to produce the *zygote*, or fertilized egg. Human cells contain twenty-three pairs of chromosomes, twenty-two of which, the autosomes, are common to both sexes and one of which, the sex chromosomes, differs sharply in males and females. In the period of the ovum, fertilization takes place in the Fallopian tube leading from the ovary, and then the fertilized ovum becomes implanted on the uterus wall. *Dizygotic*, or fraternal, twins occur when two ova are released from the ovaries and are fertilized by two different sperm. *Monozygotic*, or identical, twins occur when a division happens after the fertilization of one ovum by one sperm. Multiple births may be caused by either of the processes that produce twins, or both processes may occur at the same time.

The embryo period occurs two to eight weeks after implantation. *Cellular differentiation* occurs during this period and three layers of cells are formed: the ectoderm, mesoderm, and endoderm. By the end of two months, the embryo is about one inch long and resembles a human being. From the time it is two months old, the developing organism is referred to as the *fetus*. Especially during this period, but throughout pregnancy, the developing child can be adversely affected by poor maternal nutrition and by infections and drugs transmitted by the mother. Birth occurs approximately 270 days after conception and begins with *lightening*, the changing of the fetus to a head-down position, which is followed by the process of *labor*.

The *Apgar score* is an assessment of the medical condition of the infant at birth on five different aspects of health. Infants born prematurely are more likely to have low Apgar scores and possible deficiencies and debilities in later development. The neonate has a number of involuntary reflexes, such as breathing, coughing, and blinking and those related to feeding. Considerable evidence indicates the capabilities of newborns to adapt to their environment and learn from experience. Although *maturation* is largely responsible for early development and growth, individual differences in amount and kind of activity are apparent shortly after birth. In a study that illustrates such differences, Schaffer and Emerson found that some infants are "cuddlers" who seek physical contact, while others are "non-cuddlers" who try to avoid it.

Bodily growth patterns are relative to the age of the child. Early development proceeds *cephalocaudally* and *proximodistally*. There are large individual differences in the rate of growth, and evidence suggests that each individual displays a biologically determined growth curve.

Two processes of motor growth—*differentiation* and *hierarchic integration*—allow the child to increasingly manipulate his or her environment. The first two years of life involve increasing physical growth and competence, which is reflected in a variety of milestone activities. Manual skills progress from simply touching and holding objects (at twenty weeks) to turning the pages of a book (at eighteen months), and motor skills progress from holding the head up to running and climbing.

Genetic Determinants of Behavior

CHAPTER 4

OUTLINE

MENDELIAN PRINCIPLES OF INHERITANCE
OTHER GENETIC MECHANISMS
    Sex-linked Inheritance
    Further Complexities in the Process of Inheritance
DETERMINING GENETIC INFLUENCE ON HUMAN BEHAVIOR
    Heritability and Behavior Genetics: A Perspective
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    The Adoptee or Foster Family Method
INTELLIGENCE
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    Mental Retardation
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    Empirical Evidence of Genetic Influence on Schizophrenia
HERITABILITY OF PATTERNS OF SOCIAL BEHAVIOR
    Introversion-Extroversion
    Temperament and Emotional Reactivity
    Activity Level
    Heredity and Environment in Perspective
SUMMARY

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That a person's physical characteristics and social dispositions can be passed on "through the blood" from one generation to another is an ancient idea. It was not until quite recently, though, that the fundamentals of genetic transmission were carefully investigated or adequately established. It is to these mechanisms and principles, and to the investigations they have inspired, that the present chapter is devoted. We will first consider the nature of hereditary transmission itself, then turn to some of the major research methods and issues of interest to developmental psychologists, and finally address the interesting but thorny question of the degree to which human behavioral dispositions are genetically determined.

MENDELIAN PRINCIPLES OF INHERITANCE

Much of our present understanding of human heredity comes to us from Gregor Mendel, a then-obscure nineteenth-century monk. From his original publication in 1865 until 1900, Mendel's ideas were not popular with most experts of the day. But, as with many extremely important notions, they were later rediscovered almost simultaneously by others—in this case, the Dutch biologist Hugo de Vries, the German botanist Karl Correns, and the Austrian Erich Tschermak.

Working with common garden peas, Mendel first identified overt characteristics in which the plants differed and then mated dissimilar ones. For example, he carefully cross-fertilized smooth-seeded and wrinkle-seeded plants to see how this selective breeding would affect the next generation. When the resulting pods were ripe, there was no evidence of the wrinkledness; rather, all the offspring displayed smooth seeds. When these second-generation plants were allowed to self-fertilize, however, the resulting third generation had both smooth and wrinkled seeds, in the ratio of 3:1. A similar pattern was found for several other characteristics, as can be seen in Table 4–1. Mendel's self-appointed task was to explain why some characteristics disappeared in the second generation only to reappear in the third generation in one-fourth of the plants.

TABLE 4-1

RESULTS OF MENDEL'S EXPERIMENTS WITH SEVEN CHARACTERISTICS OF THE PEA PLANT. Although the first generation involves mating parent plants with dissimilar characteristics, the overt appearance, or phenotype, of second-generation plants is invariably only one form of the characteristic, the dominant one. Nonetheless, the second-generation plants carry the remaining recessive form of the characteristic and transmit it to the third generation, where it appears in the approximate ratio of 3:1.

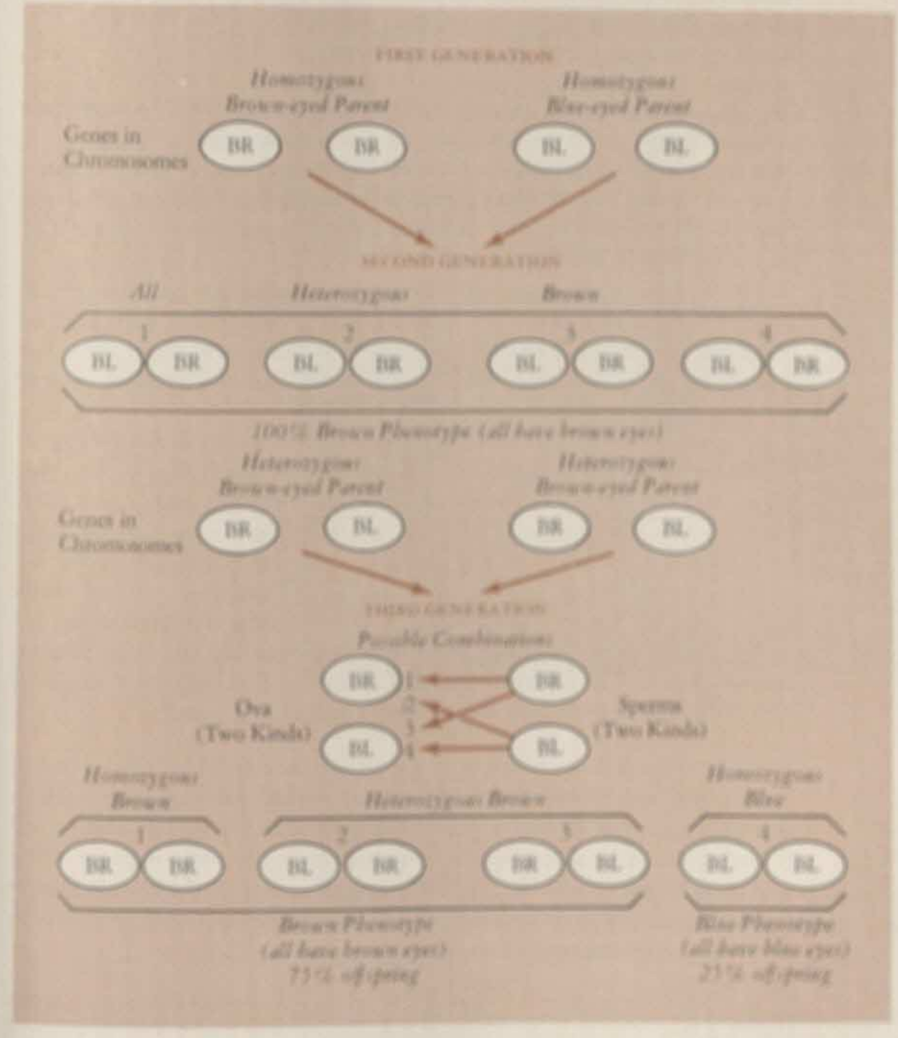
		THIRD GENERATION		
FIRST GENERATION	SECOND GENERATION	*Same as second generation*	*Displayed other form*	*Ratio*
Smooth vs. wrinkled seeds	smooth	5474	1850	2.96:1
Yellow vs. green seeds	yellow	6022	2001	3.01:1
Violet vs. white flowers	violet	705	224	3.15:1
Inflated vs. constricted pods	inflated	882	229	2.95:1
Green vs. yellow pods	green	428	152	2.82:1
Axial vs. terminal flower position	axial	651	207	3.14:1
Tall vs. dwarf stem length	tall	787	277	2.84:1

Source: Mendel, 1865.

To do so, he assumed that each of the parent plants contained two hereditary factors that were different forms of the particular characteristic. These factors, later called *genes*, separated in the gametes (see Chapter 3, pp. 39–40); the second generation, therefore, received two genes influencing the characteristic, only one of which was contributed by each parent. Mendel also proposed that when dissimilar forms of the characteristic were transmitted to the offspring (a so-called *heterozygous* gene pair), one, which he labeled *dominant*, always displayed itself over the other, which was called *recessive*. On the other hand, when the same form was transmitted by both parents (i.e., when the gene pair is *homozygous*), it was necessarily displayed. Thus, the dominant form was overtly manifested in the offspring if it was transmitted by both parents or if it was passed on by only one parent, whereas the recessive form appeared only if it was contributed by both parents.

It is obvious, then, that a form not overtly displayed may still be present, to be passed on to future offspring. The distinction can thus be made between *genotype*, the entire genetic endowment, and *phenotype*, the outward manifestation of the genes. Figure 4–1, which shows the inheritance of brown-blue eye color in humans, demonstrates this difference as well as representing exactly Mendel's findings. Note that, paralleling the plant examples in Table 4-1, only the dominant form (brown) appears in the second generation, but that both brown and the recessive form (blue) are displayed in the third generation in the ratio 3:1.

FIGURE 4-1
Inheritance of brown-blue eye color in humans assuming brown-eyed and blue-eyed homozygous parents in the first generation. Brown is dominant and blue is recessive.


FIRST GENERATION
Homozygous Brown-eyed Parent
Homozygous Blue-eyed Parent
Genes in Chromosomes
BR
BR
BL
BL
SECOND GENERATION
All Heterozygous Brown
1
2
3
4
BL
BR
100% Brown Phenotype (all have brown eyes)
Heterozygous Brown-eyed Parent
Heterozygous Brown-eyed Parent
Genes in Chromosomes
THIRD GENERATION
Possible Combinations
Ova (Two Kinds)
Sperm (Two Kinds)
Homozygous Brown
Heterozygous Brown
Homozygous Blue
Brown Phenotype (all have brown eyes) 75% offspring
Blue Phenotype (all have blue eyes) 25% offspring

OTHER GENETIC MECHANISMS

So far, we have seen how some of Mendel's principles apply to examples of hereditary mechanisms involving the influence of a single gene contributed by each parent. Among the other human characteristics inherited *monogenically* are straight versus curly hair, and such abnormalities as excessively short fingers and toes (brachydactylism), albinism, sickle cell anemia, and a type of mental deficiency known as phenylketonuria. But many other mechanisms operate to complicate the process. One particularly interesting example can be found in sex-linked characteristics transmitted genetically.

SEX-LINKED INHERITANCE

Certain heritable characteristics are said to be *sex-linked* because they are influenced by genes located on the sex chromosomes. Recall from Chapter 3 that females always have two X chromosomes, whereas males have one X and one Y. A moment's reflection tells us that a male therefore always receives his only X chromosome from his mother and can pass it on only to his daughters.

The heavier X chromosome also carries more genes than does the Y, which explains why many sex-linked physical conditions, such as color blindness, are much more common in men than in women. (The frequency of red-green color blindness is more than eight times greater for men than for women [McClearn, 1970].)

Suppose a female receives the recessive gene that may produce color blindness from her mother. The daughter will probably *not* be color blind because the X chromosome received from her father will most likely contain the dominant gene for normal color vision. On the other hand, when a son receives the recessive color blindness gene from his mother, its influence cannot be offset by a dominant normal-vision gene from his father because the Y chromosome received from his father has no gene for this type of color vision at all. The same reasoning can be used to demonstrate that all color-blind women must have had fathers who were also color blind. Can you see why?*

FURTHER COMPLEXITIES IN THE PROCESS OF INHERITANCE

Not all characteristics influenced by inheritance fit Mendel's model of dominance and recessiveness. In certain plants, for example, color is *partially* dominant so that a plant that genotypically carries both a red flower gene and a white flower gene may have the phenotype of being a very light pink (McClearn, 1970). Irregularities in the chromosomes themselves also may occur, or genes may spontaneously change (mutate), thereby producing new characteristics.

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*A color-blind woman must have received the recessive color-blind gene from both her mother and her father. If her father carried color blindness on his X chromosome he must have been color blind, because his Y chromosome does not have a color-vision gene.

Further, some traits are transmitted by *polygene* inheritance, which means that many genes influence a characteristic in an additive way, so that the attribute tends to vary continuously. In the case of intelligence, for example, individuals are not only extremely bright or dull; rather, they fall into the entire range between these extremes. Polygene inheritance is of great importance in man, partly determining, besides intelligence, such characteristics as height, weight, skin color, and perhaps more importantly to the psychologist, temperament.

Many genes also seem to influence the developmental process itself. Gerald McClearn, a highly regarded developmental geneticist, has put it this way:

> It is most important to appreciate that the influence of genes is not manifested only at conception or at birth or at any other single time in the individual's life history. Developmental processes are subject to continuing genetic influence, and different genes are effective at different times. . . . The timing of gene action, for example, is shown by the late onset of Huntington's chorea [a nervous system disorder of genetic origin]. The genes responsible for determining blood groups, on the other hand, appear to have their effect early in the development of the fetus, and the phenotype remains unaltered throughout life. [1970, p. 61]

Genetic influence on many complex patterns of development has been shown by experimental research with animals. Selective breeding for onset of puberty in rats, that is, early versus late, has produced quite dramatic results (Stone and Barker, 1940). Complex experimental mating procedures in the mouse have even succeeded in altering longevity, the duration of the life span itself (Hrubant, 1964).

Unfortunately, much is still not known. Whereas tracing single-gene inheritance can often be accomplished by noting the pattern of ratios in which an attribute appears, identifying many genes involves more complicated statistical analyses. It is also difficult to delineate characteristics controlled by many genes, for such characteristics do not fall into all-or-none categories. Finally, attributes determined by multiple genes are particularly susceptible to influence from the environment (Davis, 1970).

DETERMINING GENETIC INFLUENCE ON HUMAN BEHAVIOR

Understanding genetic mechanisms that influence development is, however, not the only aspect of heredity of interest to psychologists. An additional question, always of enormous importance, is the degree to which a person's *behavior* is subject to hereditary influence.

There are no genes that directly produce behavior, of course. What genes *can* do is influence the growth and operation of certain biological underpinnings of behavior, by influencing the structure and action of our neurons, hormones, and enzymes. These chemical and physical conditions in turn interact with the environment, and thus, sometimes quite indirectly, genes can influence behavior. Heredity probably defines the range and limits of our potential in certain areas, but few if any social characteristics are as directly heritable as physical characteristics such as eye color.

HERITABILITY AND BEHAVIOR GENETICS: A PERSPECTIVE

Behavior genetics is that branch of science dealing with the influence of an organism's genotype on its behavior. Part of behavior genetics is concerned with explaining differences *between* species. Many unique fixed-action patterns in such varied behaviors as mating, aggression, and territoriality have been shown to be controlled biologically through species-wide genetic characteristics that have been shaped by evolutionary pressures (e.g., Eibl-Eibesfeldt, 1970; Gottesman, 1966). The issue becomes more complex, however, when we turn to genetics for a possible explanation of *individual differences within a species.* We know, of course, that such differences do exist. Some people are generally more friendly, more aggressive, more intelligent, more excitable, or simply more active than others. The human behavior geneticist tries to determine whether any of these differences are rooted in a person's unique genetic endowment.

The problem is that such questions are often difficult to even investigate sensibly. When a child is very similar in intelligence or sociability to one or both biological parents, it is commonly inferred that these characteristics have been inherited. But a youngster with very bright parents may appear to be quite bright because his or her parents provide a relatively rich environment rather than because of the genetic contribution they have made. Argument and intuition alone do not enable us to discriminate between these two alternatives. Instead, a research strategy in which either heredity or environment is varied while the other is held constant is needed if we are to sort out genetic and environmental influences on behavior.

ANIMAL STUDIES

We have said that true experimentation, in which the researcher directly manipulates the events of interest, is the psychologist's most powerful method of research. Although such genetic experiments are not possible with humans, they can be performed with animals to shed some light on the possible role of heredity on human behavior. At least for the species involved, these studies can prove directly that certain behavior patterns do have a genetic component. Experimental comparison of inbred strains and purposeful selective breeding will serve as our examples here.

Inbred strains Inbreeding experiments begin with a group of male and female animals of the same species; the researcher mates their offspring so that brothers and sisters are always paired together. After a number of generations, often as many as twenty, this process will produce separate "pure" strains. Thus within each strain the animals are genetically alike, but there are definite genetic differences between the strains. Throughout the entire process the animals, reared in the laboratory, all experience identical environments; *therefore any behavioral differences between the strains can be attributed with certainty to genetic factors.* In animals the method has demonstrated a genetic component in such diverse behaviors as learning, sexual behavior, alcohol preference, and aggression (McClearn, 1970).

Selective breeding Selective breeding, another experimental method employed only with animal subjects, involves the mating of animals who are extreme on some characteristic (e.g., the fastest with the fastest and the slowest with the slowest) and continuing in this fashion through several generations. When using this method, genetic theory predicts an increasing separation in behavior among the groups as they become more genetically dissimilar, despite identical environments. In investigating principles governing learning, for example, experimenters have recognized that some rats learned much faster than others to find their way to the feeder of a maze, a complex of unfamiliar corridors. One investigator (Thompson, 1954) then interbred maze "bright" animals and maze "dull" ones separately for six succeeding generations. As seen in Figure 4–2, the difference in learning ability between the two groups steadily increased as selective breeding continued. Eventually, in the sixth generation, the maze "dull" strain made 100 percent more errors than the maze "bright" strain. Selective breeding studies have also demonstrated the heritability in animals of emotionality (Broadhurst, 1958), aggressiveness (Lagerspetz, 1961), and sex drive (Wood-Gush, 1960).

INSPECTION OF FAMILY TREES

The kinds of investigations just described require tight environmental control and restricted mate selection—forbidden with humans for obvious ethical reasons. Researchers have therefore turned to various correlational methods to come upon the desired information indirectly. Examination of family trees once seemed a reasonable place to start, and several variations of the approach were developed.

Pedigree analysis In a pedigree analysis, the investigator identifies a representative or *index case* of the characteristic or disorder of interest. He or she then studies the family history, examining each relative of the index case to determine possible known patterns of inheritance. Early pedigree analyses, however, simply identified the characteristic in relatives.

One of the most interesting early pedigree analyses was published by Henry Goddard in 1912, concerning the two distinct family lines of Martin Kallikak. As a Revolutionary War soldier, Kallikak reputedly had an affair with a feeble-minded tavern girl which eventually resulted in

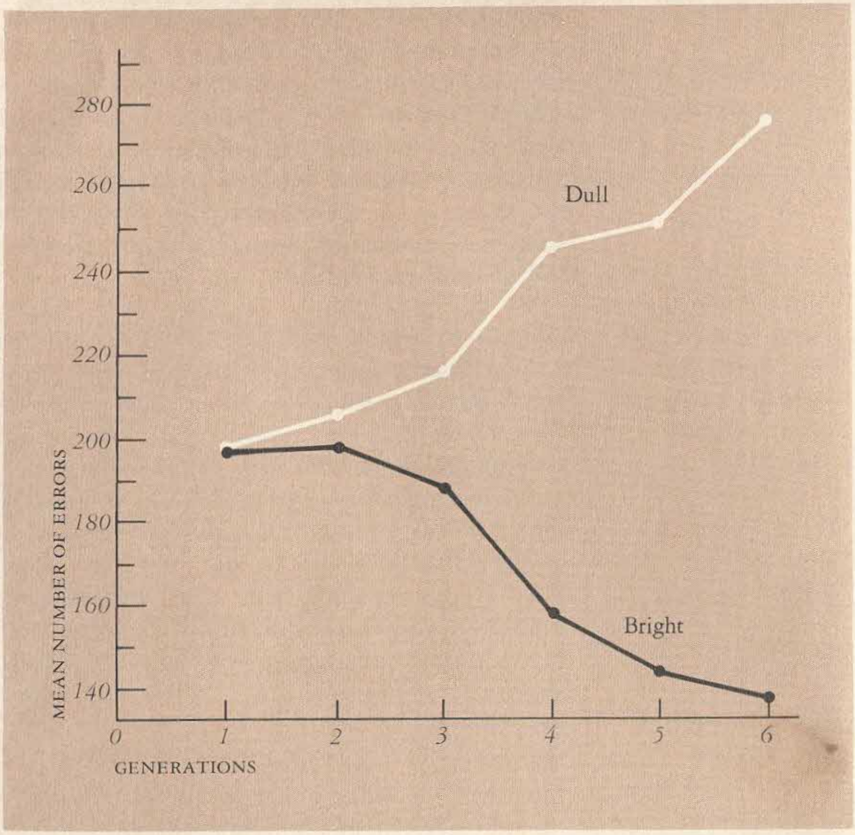

FIGURE 4–2
Errors in maze learning for successive generations of selectively bred "bright" and "dull" strains of rats. From A. R. Jensen, How much can we boost IQ and scholastic achievement? *Harvard Educational Review*, 39, Winter 1969, p. 49. Copyright 1969 by the President and Fellows of Harvard College.

480 descendants. Another line of 496 descendants was produced as the consequence of his later marriage into presumably better stock. Interviews of all family members or persons who knew them revealed a striking difference between the two lines, with Kallikak's first liaison resulting in more mental deficiency, "immorality", alcoholism, and criminality. The difference was attributed to hereditary factors. Goddard concluded that he had separated the effects of nature and nurture, and the study supported the passing of many compulsory sterilization laws (McNeil, 1966). In fact, the investigation was contaminated by many weaknesses, including inability to locate all family members, death of some of the descendants, refusals to be interviewed, and unreliability of verbal reports of friends. And the possibility that the two family lines experienced different environments was evidently not seriously considered.

Consanguinity studies Investigations of *consanguinity* (literally meaning "with the same blood") require information about the frequency or degree to which a characteristic is present in the relatives of an index case, as well as in the general population. The characteristic presumably is genetic in origin if it occurs more frequently among first-degree relatives (such as one's parents, siblings, and children) than among second-degree relatives (such as one's grandparents, aunts, or nephews). Moreover, it should be more frequent among the latter group than among randomly selected members of the population at large who are unrelated to the index case. Using such an analysis, Lennox, Gibbs, and Gibbs (1940) found that whereas only 10 percent of the population at large showed occasional abnormalities in brain wave patterns (EEG), some 60 percent of the nonepileptic relatives of epileptic patients displayed them.

However, for behavior genetics, this method, too, has its interpretive pitfalls. Rosenthal (1970) notes:

> Although such studies are well worth undertaking for their own sake, the inference of a genetic basis must be held in abeyance until it can be shown that the association between incidence and consanguinity cannot be explained on some other basis. We might conceivably find a similar association . . . where environmental factors may be of overriding importance. [p. 37]

Another approach, the so-called *twin study method,* overcomes some of the difficulties inherent in both pedigree and consanguinity studies.

TWIN STUDY METHOD

Approximately 1.2 percent of all births produce two children.* About two-thirds of the twin pairs are *dizygotic* (cf. Chapter 3), and the members are no more like each other genotypically than are siblings born months or years apart. On the other hand, the small remaining group of *monozygotic* twins, who develop from the same union of ovum and sperm, are genetically identical. The degree to which monozygotic twins are more alike on a characteristic than dizygotic twins (or siblings) provides a basis for determining the influence of genetic endowment. Customarily, comparisons are made only among children who have been reared together, so that the environment is held reasonably constant.

The similarity or *concordance* of pairs of individuals, on measures such as IQ or personality tests, usually is assessed in such studies. Dissimilarities between twins on these measures are instances of *discordance.* The question can then be asked: Is there greater concordance among monozygotic twins on a particular measure than among same-sexed dizygotic twins reared together? For a variety of characteristics and behaviors, as shown in Figure 4–3, the answer appears to be yes.

An important assumption often made in twin studies is that the environments of both kinds of twins, reared together, do not substantially differ. Although being reared together does minimize overall environ-

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*This figure is probably increasing slightly in Western societies since the advent of the use of ovulation-inducing drugs which appear to increase the frequency of multiple births (Lerner, 1968).

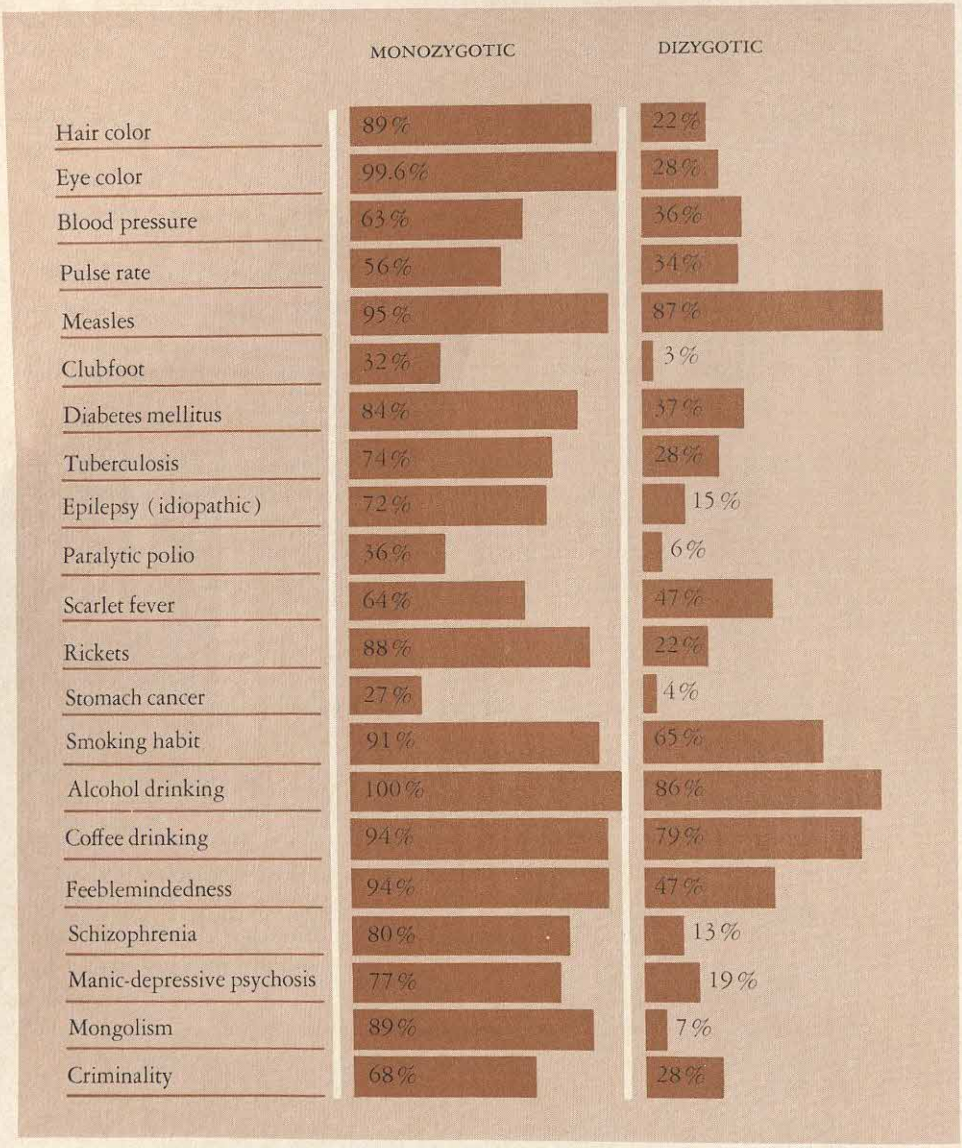


FIGURE 4–3
Percentage of concordance or similarity between dizygotic twins and monozygotic twins for a variety of characteristics and diseases. Reprinted with permission of Macmillan Publishing Co., Inc., from *Genetics* by M. W. Strickberger. Copyright © Monroe W. Strickberger, 1968.

mental differences *between the members* of a twin pair, monozygotic twins nevertheless have more common experiences than dizygotic twins. Only fraternal twins can differ in sex, and members of different-sexed pairs undoubtedly are treated less alike than same-sexed pairs. Monozygotic twins are also more likely to have the same friends, to dress alike, and to share in such activities as studying or attending sports events than even same-sexed dizygotic twins (Smith, 1965). Perhaps these differences have only a minor influence, but this limitation of the twin study should be kept in mind.

THE ADOPTEE OR FOSTER FAMILY METHOD

When parents rear their own biological children, the source of any parent-child similarities observed later is uncertain. The parents *may* have transmitted their own characteristics genetically, but it is equally plausible that the transmission process is social; children may learn to be like their parents because of the general environment and specific instruction and example these adults provide. On the other hand, parents rearing children they have adoped can only transmit their own characteristics socially. If we therefore compare the resemblance on some characteristic of biological parents and their children with that of adoptive parents and theirs, and if we find greater similarity among the biological pairs, then the characteristic in question is influenced by heredity. This reasoning lies at the heart of the various adoptee methods of genetic research. But things are never simple. The comparison of foster and biological parent-child pairs has a number of pitfalls, some minor and some rather serious.

One assumption of the adoptee method is that the child shares the same environment with his adopted family but has no genetic relationship to it. Much, perhaps too much, has been made of the fact that this assumption is sometimes not met. If a child is adopted by a relative rather than a complete biological stranger, or is placed in a foster home as similar as possible to that which might have been provided by his "true" parents (in educational level, for example), then the similarity between foster child and parent will be artificially increased over what is assumed by the method. This artifact will either be unimportant or will falsely close the gap between adoptive and biological pairs; it can never wrongly lead us to conclude that hereditary factors are important where they are not.

A more important issue appears to be the difficulty of obtaining adequate measures of the biological parents of an adopted child, inasmuch as the parent is unlikely to be available for psychological testing and assessment as the study proceeds. Records must often be used instead, and they may not have the exact information the researcher seeks. Adoption agencies are, for example, likely to obtain information about a biological parent's education, employment status, or criminal record but are unlikely to administer an IQ or a personality test. Reconstructing the psychological characteristics of a child's biological parents unseen can easily lead to error.

We can now turn to some of the substantive aspects of behavior and development in which genetics have been implicated. Any one investigation mentioned may combine the methods discussed in the preceding pages or variations of them in order to obtain maximal information.

INTELLIGENCE

It is extremely difficult to arrive at a totally satisfactory definition of intelligence. Whether the term should designate the ability to learn, rate of learning, the ceiling upon what can be learned, or yet some other human capacity is still undecided. In a later chapter this topic will be discussed in detail, but for the present purposes *intelligence* simply will refer to performance on a variety of tasks or tests which presumably tap mental ability.

CORRELATIONAL STUDIES

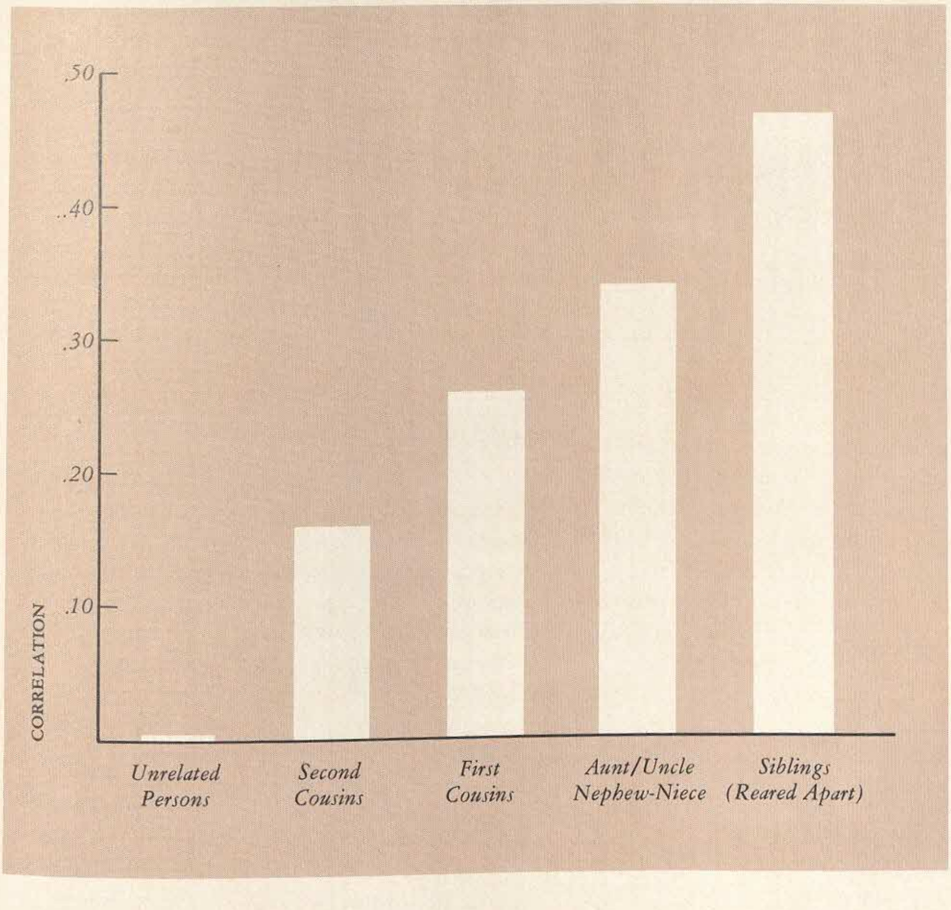
The notion that human intelligence is at least in part genetically determined is perhaps a little distasteful to members of a society that cherishes the belief that "all men are created equal." Nevertheless, both animal studies and a great deal of research involving humans support the view that at least some of the intellectual variation among people can be traced to differences in genetic endowment.

Sir Francis Galton (1822–1911) was among the first to study the possibility that intelligence might be inherited. Influenced by the work of Charles Darwin, his half cousin, he argued that eminent men tend to be related to one another. As evidence, he presented the genealogies of the families of prominent men in the fields of law, science, art, and the military, which indicated that greatness ran in certain families. Although Galton set up a proposition that would later be tested repeatedly, the pedigree analysis that he employed failed to distinguish between the effects of heredity and environment.

Consanguinity studies Galton's work was flawed badly by potential bias, but its basic logic was not unsound: If intelligence is heritable at all, people who are closely related should be more alike in intelligence than those who are less closely related. The proposition can be tested more adequately with consanguinity data, now available from a summary by Jensen (1969) of over one hundred studies in eight different countries. In reviewing this work, the first point to notice is that arbitrarily picked pairs of people who are unrelated biologically and who do not interact together socially will not be similar in IQ at all—that is, the correlation between the IQ scores of many such pairs will average to 0. This fact may be seen in Figure 4-4, which also shows portions of the consanguinity data that Jensen summarized. Note also that IQ similarity increases directly with increasingly close biological relationships, a result that is consistent with the genetic hypothesis.

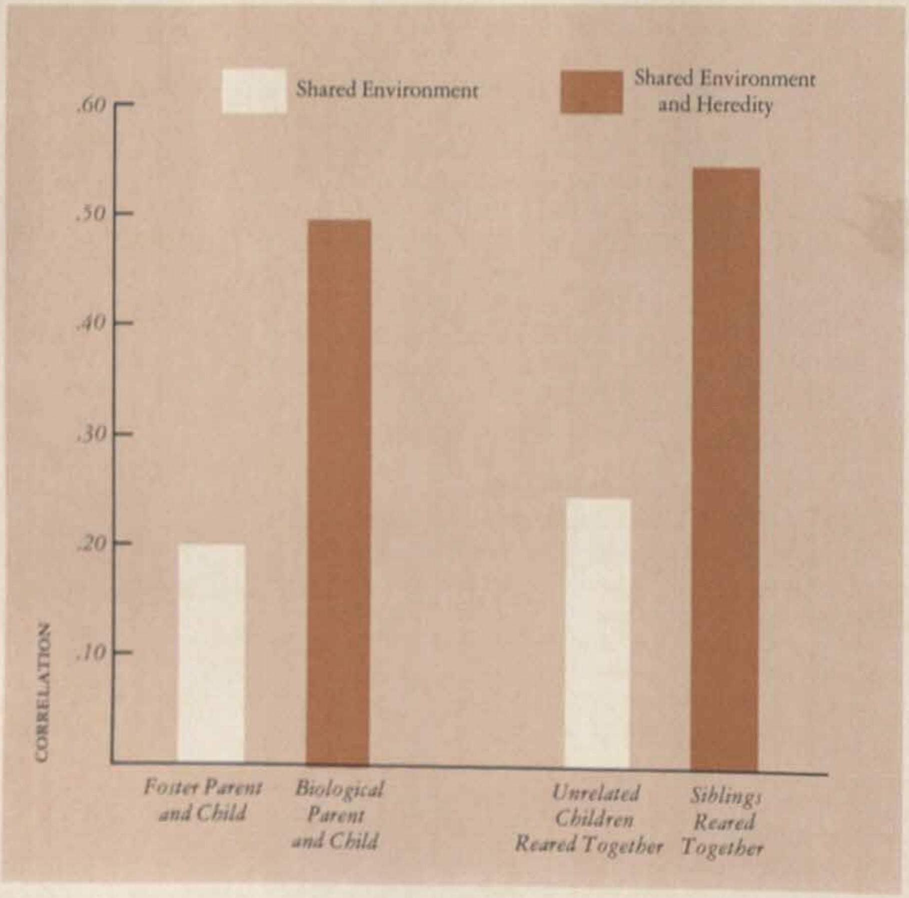
Twin studies Further evidence suggesting the existence of an hereditary factor in IQ is found in several major studies involving identical twins who were separated early in life and brought up in different homes. In a study by Newman, Freeman, and Holzinger (1937), the Stanford-Binet Scale was administered to nineteen pairs of separated monozygotic twins, revealing an average correlation of .77 between the scores of each member of the pair. A corroborative finding was obtained by Shields (1962), with a different test of intelligence. The high degree of similarity between IQ scores of twins sharing identical genetic constitutions but having different environments, as indicated by these studies, strongly supports the notion that inheritance, at least in part, plays a role in determining IQ. In fact, while the median correlation of IQ scores between monozygotic twins reared apart is +.75, the median correlation for same-sexed dizygotic twins reared together is just barely above +.50, a difference that is quite significant.

FIGURE 4-4
Portions of the consanguinity IQ data summarized by Jensen (1969), supporting the notion that intelligence is influenced in part by hereditary factors.



Foster children Comparisons of adopted or foster children with those reared by their biological parents will complete our picture of the available correlational data. The facts, shown in Figure 4–5, seem quite clear. While biologically unrelated persons who live together (foster parent and child, unrelated children brought up in the same home) show a degree of IQ similarity obviously resulting from environmental factors, parallel correlations for persons who are living together *and* related biologically are much higher. Here again, the outcome suggests some genetic influence.

FIGURE 4-5
Similarity of IQ between related and unrelated persons living together. Although there is some similarity between foster parent and child and between unrelated children growing up in the same home, the similarities are much greater among individuals who also partly share a common heredity. Data from Jensen, 1969.



EXTENDED DISCUSSION

SOCIAL ISSUES AND IQ HERITABILITY

The data reviewed in the foregoing section suggest quite clearly that there probably is some hereditary component in IQ. But the important social question remains: What are the practical implications of these findings? To answer, we shall consider two closely related issues that arise from genetically oriented IQ research.

HERITABILITY FINDINGS AND RACIAL OR ETHNIC BIAS

In a later chapter we shall see that whites regularly score higher than blacks on IQ tests, and that numerous other IQ differences have been observed among various ethnic, racial, and social class groups. Data suggesting the heritability of individual differences in IQ, though based almost entirely on research with persons of white European background, may seem to indicate that racial or ethnic differences are also rooted in genetics. One psychologist, Leon Kamin (1974), has dismissed the entire body of scientific literature on heritability of IQ as sociopolitically slanted and methodologically unsound. A few of the points he makes will give the flavor of his argument.

Kamin's most central point is that IQ data of the kind we have reviewed can—and often have—become the "scientific" justification for discriminatory practices. He illustrates the point by reviewing the use of psychological intelligence tests during the early 1900s, when at least some psychologists tried to reduce the number of eastern and southern European immigrants by showing that the great majority were "feeble-minded"—one investigator claimed that 83 percent of Jews, 80 percent of Hungarians, 79 percent of Italians, and 87 percent of Russians would fall into the feeble-minded category. It is easy to see how an interest in faulting all genetic research on intelligence could be spurred by this dark chapter in the use of IQ tests.

Kamin's arguments are not limited to the *use* of heritability data; he also challenges the findings themselves. Here is one example. A major assumption in studies of twins and other siblings reared apart is that their environments are no more similar than would be the case for any two randomly selected, unrelated children; only in this way can similarities in the siblings' IQ scores be attributed to heredity. Kamin (1974) points out that this assumption has often not been met, offering these examples of the problem of "separated" twins:

> Benjamin and Ronald, separated at 9 months:
>
> "Both brought up in the same fruit-growing village, Ben by the parents, Ron by the grandmother. . . . They were at school together. . . ."
>
> Bertram and Christopher, separated at birth:
>
> "The paternal aunts decided to take one twin each, and they have brought them up amicably, living next door to one another in the same Midlands colliery village. . . . They are constantly in and out of each other's houses. . . ." [Cited on p. 11]

Kamin points to similar problems in dealing with correlations between adopted children and children reared by their biological parents. Here the assumption would be that the environments of the two groups would be similar, yet foster parents in many studies have been older than biological parents and have had significantly higher incomes as well.

Do problems such as these completely nullify the research data we have been discussing? Most likely they do not. The many positive correlations certainly show that factors influencing intelligence are transmitted somehow, genetically or socially; otherwise, parents and children or brothers and sisters would be no more alike in IQ than completely unrelated people. These correlations probably cannot be explained in full by small variations in the family income, home environment, or community in which participants in the various studies happened to live, and therefore some genetic contribution seems likely.

A more important point about the twin and adoptee studies of IQ is that logically they do not even bear on the possibility of racial or ethnic differences. It remains plausible that individual differences in intelligence are influenced by genetic factors but that, on the average, whites and blacks do not differ *as groups* in their genetically determined intellectual ability. There is in fact much evidence (to be reviewed in Chapters 8 and 13) that observed group differences are related to social circumstances and not genetic factors. And of course the issues Kamin has raised should sensitize us to the possibility of using psychological findings improperly.

HERITABILITY FINDINGS AND THE POSSIBILITY OF RAISING IQ

If a child's IQ score is partly determined by hereditary factors, we may also wonder what implications this fact has for the possibility of raising IQ. At first blush, it appears that, to the extent that IQ is genetically determined, it is relatively impervious to modification by environmental influences. As will become apparent from the following considerations, *this conclusion is erroneous*.

McCall (1970) has reported IQ assessments, made at the Fels Research Institute, of 270 children who had been administered intelligence tests every six months from three to six years of age and subsequently once a year through age twelve. The sample included thirty-five parent-child and one hundred sibling pairs, each member of whom had taken the same tests during childhood. In addition, comparable unrelated pairs were included as controls.

With several IQ scores for each subject, not only could the general level of intelligence for each individual be estimated but the developmental pattern (as represented by a graph of each subject's scores on eight or more tests taken at different ages) could be evaluated. Observation of the developmental patterns revealed that there may be a great deal of fluctuation in an individual's IQ score, at least between the ages of three and twelve years.

Given these intriguing results, the investigator asked the question, "Does the child's genetic endowment determine the pattern of change that occurs as he or she grows older or does the environment produce these developmental changes in IQ?" If heredity indeed plays a role in producing developmental trends in IQ, then the closer the familial relationship between two individuals, the more similar their patterns of change will be. Interestingly, the findings indicate that *change patterns are no more similar for related than for unrelated subjects*.

What does account for developmental changes in IQ? McCall suggests that although general IQ level is set genetically, environmental circumstances may produce sizable changes in it. The environmental elements that may be shared by siblings, such as the intellectual climate of their family, apparently are not responsible for the change patterns. Rather, experiences that are unique to the individual may account for the fluctuations. Thus, although IQ is genetically based to a certain degree, it is *not* immutable to change by environmental influences.

MENTAL RETARDATION

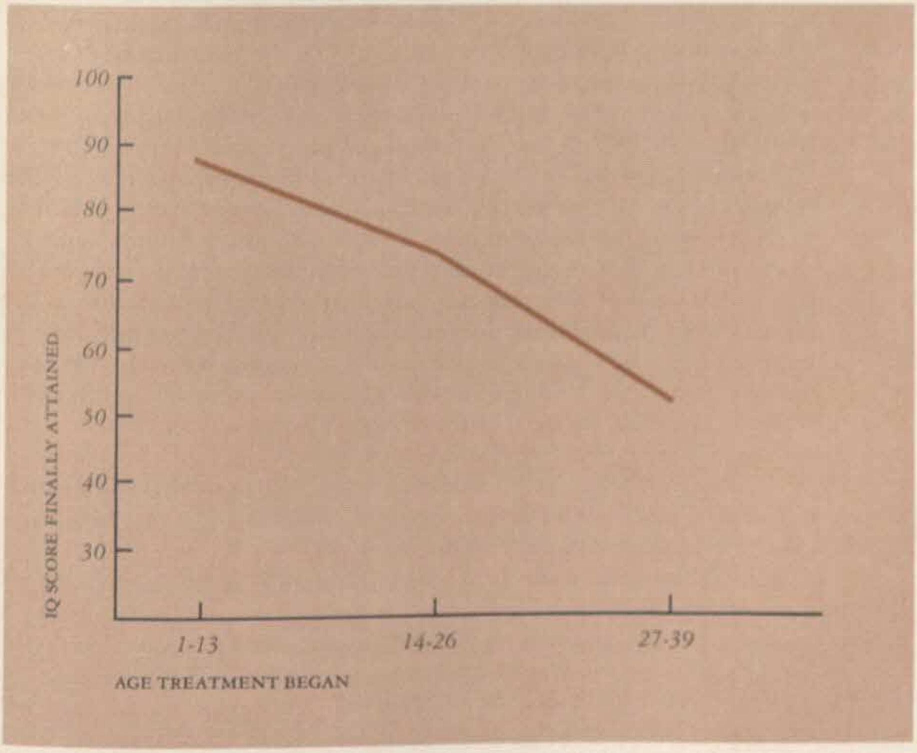
When we look to mental retardation, we find the most severe genetic restrictions of intelligence as well as demonstrations of dramatic breakthroughs in diagnosis and treatment. Although it is beyond the scope of this book to fully discuss the many genetic abnormalities that have been identified, examples of a few of the more commonly known ones will be described.

PKU The biological basis for phenylketonuria is the lack of the enzyme that metabolizes the amino acid phenylalanine to tryosine. Incomplete oxidation results in the production of particular substances which are injurious to the nervous system. The defect, which is transmitted by a single recessive gene, results in retardation in the majority, although not all, of untreated individuals. It has been estimated that PKU is responsible for about 1 percent of all institutional retardates and occurs in one case per twenty thousand live babies.

It is possible to detect PKU within the first two weeks of life with urine or blood tests, and several states of the United States now provide massive screening programs. Early detection is extremely important because it has been found that children placed on low phenylalanine diets within the first few weeks of life show only minimal impairment of intellectual abilities. Unfortunately, if the diet restriction is delayed for very long, then a substantial and permanent intellectual deficit will occur. The pattern is shown in Figure 4–6.

Thus the PKU syndrome is an interesting example of how heredity and the external environment conspire to determine behavior. If a child

FIGURE 4–6
The effect of dietary treatment by restricting certain foods on the intellectual development of phenylketonuric (PKU) children. Note that intellectual functioning will be near normal only if the treatment is introduced very early. Data from Baumeister, 1967.



does not have the relevant mutant gene he or she can, of course, consume quantities of phenylalanine (found in bread, eggs, cheese, fish, and milk) without experiencing difficulties. Similarly, noticeable retardation will not appear in children who have the genetic component responsible for PKU if they are provided with a low phenylalanine diet. But, children with both the defective gene and an unsupervised "normal" diet frequently will become retarded.

Down's syndrome Approximately 10–15 percent of the people institutionalized for mental deficiency suffer from Down's syndrome. The afflicted show from moderate to severe retardation and are strikingly alike in physical appearance. They frequently have small skulls, chins, and ears; short, broad necks, hands, and feet; flat nasal bridges; sparse hair; a fissured tongue; and, perhaps most recognizable, a fold over the eyelid which appears oriental to Westerners and suggested the name "mongolism."

Over the years there was considerable speculation about the etiology of the syndrome, with both genetic and environmental factors being variously suspected. The fact that concordance was almost perfect for monozygotic twins and extremely low for dizygotic twins strongly supported belief in some genetic basis for the disorder (Carter, 1964). Finally, in 1959, with the improvement of cell preparation techniques, it was discovered that Down's syndrome is caused by an accidental aberration in the chromosomes, so that those with the affliction have forty-seven chromosomes rather than the usual forty-six. This characteristic is therefore genetically linked but not heritable. It has also been shown, however, that the risk of bearing a child with Down's syndrome increases very markedly with the age of the mother; the risk in a mother from forty to forty-five years of age is 55 times greater than in a mother from twenty to twenty-four years of age. The latter finding suggests that unknown factors may be capable of damaging female gametes and that the gametes of older females have suffered greater exposure to the risk. The age of the father does not influence the likelihood of Down's syndrome, perhaps because the male's reproductive cells are continually produced throughout the life span, whereas the female's reproductive cells are partly formed before birth.

Sex-chromosome aberrations We will now consider three disorders that are representative of a larger group of abnormalities resulting from aberrations of the sex chromosomes.

Klinefelter's syndrome is the most commonly occurring malady of such origin. Most often, individuals suffering from this defect have an additional X chromosome (XXY), although other variations also occur. Found exclusively in phenotypic males, it is responsible for 1 percent of all institutionalized males. As in Down's syndrome, there is an apparent error in meiosis, and the mothers of Klinefelter's syndrome children tend to be older than those in the general population. About 25 percent of the cases have below-normal intelligence, and the afflicted also suffer from atypical sexual development and skeletomuscular abnormalities.

Turner's syndrome, on the other hand, occurs in phenotypic females and is the result of a lack of sex chromosomes. Most frequently there is only a single X chromosome (XO) or a structural defect of one of the Y chromosomes. Mental deficiency occurs in about 20 percent of the cases (Robinson and Robinson, 1965), and appears to involve deficiency in organizing incoming stimulation. Other abnormalities include a lack of ovarian tissue, failure of development of secondary sex characteristics, short stature, and deformity of the neck and forearm. The syndrome does not run in families, is not associated with maternal illness or age, but does occur disproportionately among monozygotic twins (Rosenthal, 1970).

Another sex-chromosome aberration, one that has attracted considerable attention in the past few years, is the XYY male. The discovery was revealed in a report (Jacobs, Brunton, and Melville, 1965) stating that an excessively large percentage of men who were both mentally retarded and aggressive displayed this genetic arrangement. The fact that these men were also unusually tall seemed to further corroborate the idea of a complex genetically based syndrome. (It is also of interest, though puzzling, that violent XYY males were *less likely to commit crimes of violence against other persons* than were a comparable group of genetically normal XY retarded males who also had violent records.) Follow-up data disclosed further evidence of a genetic link, inasmuch as the XYY male tended to show behavior disturbance at an earlier age and to be less likely to have violent siblings than the chromosomally normal XY controls (Price and Whatmore, 1967). At least one case study has been reported to confirm the general picture further; this XYY male had become extremely aggressive by age ten and had a Stanford-Binet IQ score of 69 when tested at age fifteen—and he was also unusually tall (Forssman, 1967).

GENETIC DETERMINANTS OF ABNORMAL BEHAVIOR

Another class of behaviors that may have some genetic component is that customarily labeled seriously abnormal, deviant, or psychotic.* The largest body of research on genetic determinants of abnormal behavior has involved the etiology of the psychosis called *schizophrenia*.

---

*It should be noted that the adequacy of these labels and the reliability of their usage has been seriously challenged (e.g., Bandura, 1968; Mischel, 1968). Nonetheless, inasmuch as there are undeniable differences between the behavior of most hospitalized persons who have been diagnosed as schizophrenic and that of persons who are functioning more or less adequately in occupational and marital roles, the question of genetic determinants of abnormal behavior remains a meaningful one, despite terminological and even major theoretical disputes.

According to the American Psychiatric Association, schizophrenia "represents a group of psychotic reactions characterized by fundamental disturbances in reality relationships and concept formations, with affective, behavioral and intellectual disturbances in varying degrees and mixtures. The disorders are marked by a strong tendency to retreat from reality, by emotional disharmony, unpredictable disturbances in stream of thought, regressive behavior, and by a tendency to 'deterioration'" (1965, p. 26). Within the general category of schizophrenia, there are several subtypes (e.g., simple, hebephrenic, catatonic, and paranoid), but these differences will not be of concern here.

There has been considerable speculation about schizophrenia, and three main types of theories have been advanced to explain its occurrence. *Monogenic-biochemical* theory proposes that the presence of one particular gene, which determines abnormal metabolic function, leads to schizophrenia. The *diathesis-stress* model postulates that schizophrenia results from the coexistence of a biological predisposition to develop the illness and a set of environmental stresses to precipitate it. ("Diathesis" means constitutional predisposition toward abnormality.) Such a theory may incorporate models involving either the monogenic or the polygenic inheritance of the disorder. *Life-experience* theory ignores possible genetic determinants of the disorder and is concerned entirely with conditions in the environment that might produce it (Rosenthal, 1970). It is possible, of course, that no one theory is exclusively correct, for the disorder may have more than one etiology.

EMPIRICAL EVIDENCE OF GENETIC INFLUENCE ON SCHIZOPHRENIA

Theories that propose a genetic basis for schizophrenia logically predict that the closer the genetic relationship between two individuals, one of whom is schizophrenic, the higher the risk that the other will also obtain the same diagnosis. Considerable evidence has been collected that supports this prediction.

Franz Kallmann, a German psychiatrist who was an early worker in the field, estimated the risk of being labeled a schizophrenic by examining large samples of individuals labeled as such and their relationships to each other. Figure 4–7 summarizes some of his results, which frequently are interpreted as supporting a genetic hypothesis. Several other studies conducted in different countries have reported concurring findings (Fuller and Thompson, 1960). Overall, it has been shown, for instance, that parents and siblings of schizophrenics have a greater risk of schizophrenia than the general population, that first-degree relatives have a greater risk than second-degree relatives, and that the risk for third-degree relatives is only slightly greater than that for the population at large (Rosenthal, 1970).

Nevertheless, these findings support environmental as well as genetic theories. According to the environmentalist viewpoint, the closer the relationship between individuals, the more they will interact and influence each other's environment. Comparing the risk of monozygotic and

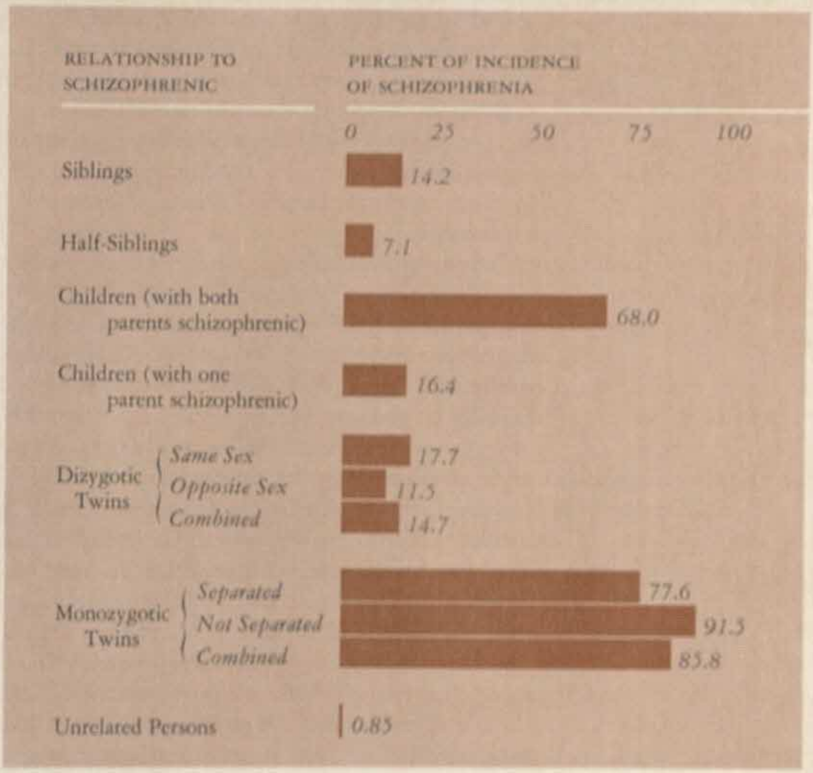


FIGURE 4-7
Schizophrenia among relatives of the schizophrenic. Adapted from *Abnormal Psychology and Modern Life* by James C. Coleman. Copyright © 1964 by Scott, Foresman, and Company. Reprinted by permission of the publisher.

dizygotic twins who were reared apart from infancy offers a better method of separating the variables, and the results of such investigations are frequently cited in support of the genetic hypothesis. Actually, though, little reliable data have been collected (cf. Jackson, 1960; Slater, 1968). In regard to the often-cited Kallmann twin studies, which showed a much greater risk for monozygotic than for dizygotic twins even when they were reared separately, Jackson (1960) relevantly points out that Kallmann's "separated" category refers only to separation five years prior to the appearance of the psychosis. Thus:

> Because his [Kallmann's] age group ranged from 15 to 44 years; and because his average age of subjects is stated to be 33 years . . . it is obvious that the twins were not apart during their formative years. Indeed, most remained together well past the usual age for marriage; and even this late in life separation resulted in a significant decrease in concordance for schizophrenia. [P. 40]

Perhaps the greatest efficiency in separating genetic from environmental variables is achieved through studying children of schizophrenics who have been adopted or reared by foster parents. For this reason, investigators have turned to the adoptee-family method. Heston (1966), for example, followed up forty-seven children who had been born to schizophrenic mothers while the mothers were being treated in state psychiatric hospitals. Not surprisingly, the infants were taken from their mothers shortly after birth and reared by adopted parents or in foundling homes. Fifty matched infants, also separated from their mothers at birth but for nonpsychiatric reasons, were identified as controls.

Heston performed extensive follow-up assessments on both groups, including a battery of psychological tests and independent ratings by two psychiatrists. The results were clear: 16.6 percent of the children of schizophrenic mothers were themselves diagnosed as schizophrenic, whereas none of the children of control mothers were so diagnosed. Equally impressive for the genetic hypothesis, the children of schizophrenic mothers were also more likely than the controls to be diagnosed as neurotic and on the average had been involved more frequently in criminal activity and had spent more time in penal institutions. Similar results, including a tendency to display psychological disorders other than schizophrenia, were found in a study of some fifty-five hundred adopted children of schizophrenic mothers in Denmark (Kety, Rosenthal, Wender, and Schulsinger, 1968).

These findings do not mean that schizophrenia is inherited directly; rather, a predisposition to psychological difficulty is transmitted, but the specific way in which the predisposition is manifested (or whether it is manifested at all) almost certainly depends upon the type and amount of stress created by the environment in later life (Davison and Neale, 1974).

HERITABILITY OF PATTERNS OF SOCIAL BEHAVIOR

Although much of the investigation into genetic bases of behavior has focused upon abnormalities and deficiencies, some interesting work is available on the genetic determinants of patterns of more "normal" social behaviors.

Among the best broad-spectrum studies is one conducted by Gottesman (1963). He began by enumerating all of the same-sexed twins enrolled in public high schools in the Minneapolis–Saint Paul area, drawing his twin sample from a population of over thirty-one thousand children. Voluntary cooperation of more than half of the twin pairs in this sample was secured. Gottesman then identified sixty-eight twin pairs —thirty-four monozygotic pairs and thirty-four dizygotic pairs, and compared concordance rates on several scales.

The measures used in the study were derived from three paper-and-pencil tests, a test of intelligence, and two personality measures. IQ scores were more closely related for monozygotic than for dizygotic pairs, and, more importantly for our present interest, six scales of the twenty-four on the personality tests were found to be more closely related for monozygotic than for dizygotic twins. Overall, Gottesman's results seem to suggest *some* hereditary component on *some* measures of personality. More recent investigations, to which we now turn, have disclosed that no more than a few particular dimensions of social behavior have an element of heritability.

Summarizing numerous studies, Vandenberg (1967) concluded that three aspects of human personality—extroversion-introversion, emotionality, and overall activity level—have a clear hereditary component. However, as was the case in our discussion of intelligence, this does not mean that environment is unimportant. In fact, all three of these personality factors have been modified in children and adults through environmental change, intervention, or special treatment.

INTROVERSION-EXTROVERSION

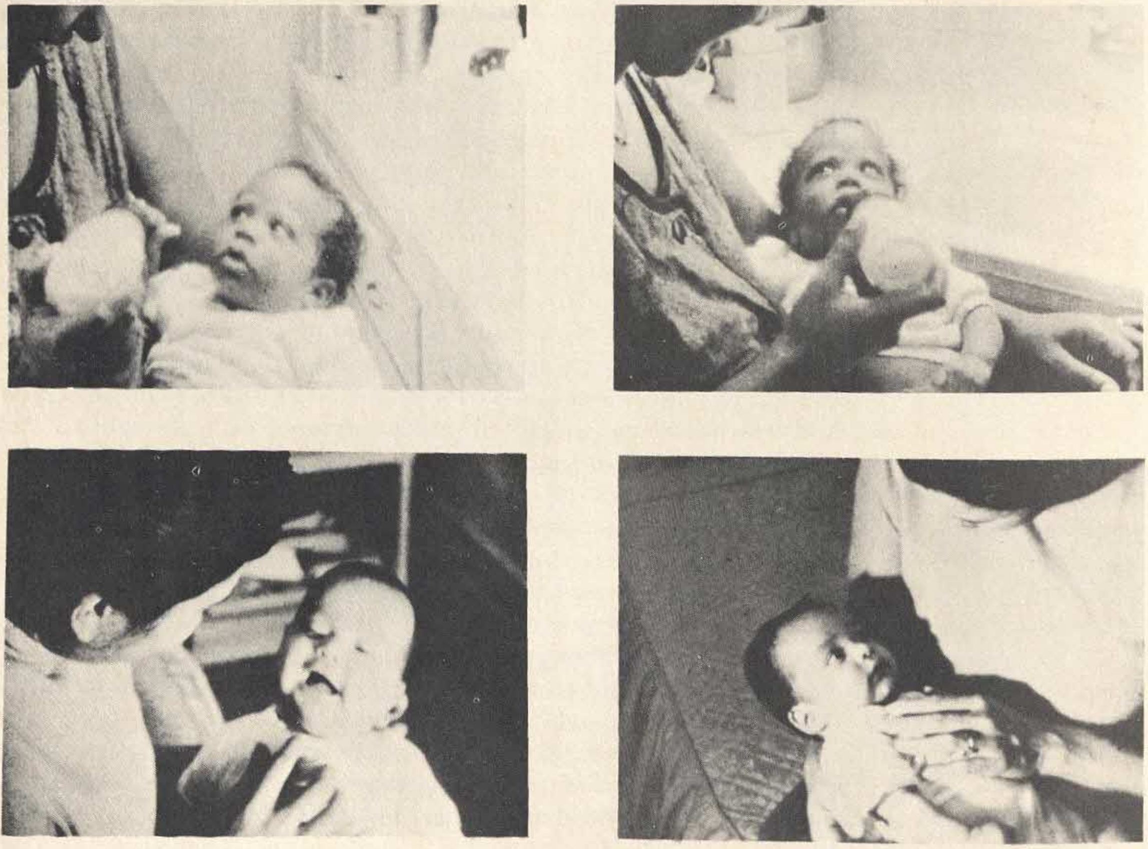
Several studies suggest that genes play a part in determining introversion-extroversion (Eysenck, 1956; Gottesman, 1966; Scarr, 1969; Vandenberg, 1966, 1967). These terms refer to two opposing styles or approaches to the social environment. An extreme introvert is shy and anxious in novel social situations and always ready to withdraw from people; an extreme extrovert is friendly, at ease among people, and ready to seek out social gatherings. Differences on this dimension may be observed during the first years of life and, moreover, do not change much over time. Friendly infants, for example, tend to become friendly adolescents, whereas unfriendly infants tend to become unfriendly teenagers (Schaefer and Bayley, 1963).

Scarr (1969) gave psychological tests to twenty pairs of female monozygotic and dizygotic twins for whom zygosity had been accurately diagnosed through the use of blood grouping. Monozygotic twins were found to be more similar on measures of introversion-extroversion than were dizygotic twins. In another investigation (Freedman and Keller, 1963), twenty pairs of same-sexed twins, eleven of whom were monozygotic and nine of whom were dizygotic, comprised the sample. Every child was filmed individually in many situations over an eight-month period. At the end of the observation period, the films of one twin in each pair were shown to a group of four judges while the films of the other twin were presented to a comparable group. The judges rated each child's behavior on several dimensions, one of which was social orientation. Comparison of the ratings showed a greater similarity in social behavior between monozygotic twins than between dizygotic twins.

Fortuitously, the films provided a clear record of the development of smiling over the eight-month period. During the first month no social smiles appeared, although the babies usually smiled as they fell asleep after being fed. In the second month, external stimulation such as the sound of a voice or bell initiated smiling; in the next stage, fixation on the mother's face preceded the infants' smiles. Until the age of five months, most infants smiled freely at anyone. They became increasingly discriminating with time, however, and began to smile only at familiar persons. From the age of nine to twelve months not only did the infants fail to smile at strangers but they displayed fear in the presence of strangers.

Monozygotic twins appeared to be more similar in age at the onset of the various stages in the development of smiling and fear of strangers than did dizygotic twins. For example, at the age of 2 months, 0 days, monozygotic twin brothers, Marty and Chucky, both displayed presocial visual fixation during feeding. Some of the photographs of these brothers are shown in Figure 4–8. They can be contrasted with photographs of Arturo and Felix, dizygotic twins who behaved quite differently from each other at the age of 2 months, 4 days. Arturo smiled drowsily with eyes closed when touched by the adult, whereas Felix was alert and sober with eyes open in the same situation.

FIGURE 4–8
Photographs illustrating the similarity of social behavior at age 2 months in monozygotic twins, Marty and Chucky (top). They may be contrasted with the dissimilarity in social behavior of dizygotic twins, Arturo and Felix, at age 2 months, 4 days. Courtesy Dr. Daniel G. Freedman.



TEMPERAMENT AND EMOTIONAL REACTIVITY

We have already mentioned several studies with animals which suggest that emotionality has an hereditary component. Support for the idea that emotionality or *temperament* (a nearly equivalent term) is also genetically influenced in humans comes from a landmark longitudinal study by Thomas, Chess, and Birch (1970). These investigators define temperament by a set of rating scales including such items as level and extent of motor activity, sensitivity to stimuli, and response to new objects. They followed the development of 141 children for over a decade by interviewing the parents periodically—every three months during the first year, every six months during years one to five, and annually after age five. The interviews were structured objectively so that parental statements, such as that their baby "couldn't stand" a new food, had to be restated by the parent in terms of specific step-by-step descriptions. In addition, some home observations were conducted by individuals unfamiliar with the child's behavioral history (and who therefore could not have had preconvictions that might bias results). From their data, the authors conclude that children show distinct individuality in temperament in the first weeks of life and that these characteristics persist over time. Acknowledging that they do not have evidence that these differences are "inborn," Thomas *et al.* state, nevertheless, that they are inclined toward this view. Support for this hypothesis is forthcoming from studies of newborns which show, for example, individual differences in the intensity of responding to stimuli which are consistent during even the first few days of life (Birns, 1965; Schaffer and Emerson, 1964; see Chapter 3, pp. 57–60.

ACTIVITY LEVEL

A person's overall activity level seems to be one aspect of personality clearly influenced by hereditary factors. We have noted previously that animals can be selectively bred for high or low activity level, and this finding is of course suggestive. In addition, two studies of clinically hyperactive children have shown that such youngsters are five to ten times more likely to have parents who were themselves hyperactive than are nonhyperactive, control group children (Cantwell, 1972; Morrison and Stewart, 1971).

If activity level is actually heritable in humans, we would expect twin studies to support the clinical studies just cited. And they do. Both Scarr (1966) and Willerman (1973) found significantly greater similarity on activity level among MZ (monozygotic) twins than among matched DZ (dizygotic) twins. In Willerman's study the correlation for activity level among MZ twins was .90, as compared with a correlation of .57 for DZ twins. A later study, reported by Willerman and Plomin (1973), shows significant correlations between the rated activity levels of normal children and the activity levels of both parents when the parents were themselves children. This last result is made more impressive by the fact that in the same study the parents' attitudes toward child rearing, though quite variable, were generally unrelated to the activity levels of their

FIGURE 4–9
Individual children differ considerably in overall activity level, a characteristic that is believed to be influenced, in part, by genetic factors. Photos by Rocky Weldon, DeWys.

children. Apparently, activity level is genetically influenced in ways evident from an early age and is not usually altered very much by the normal range of environmental circumstances.

HEREDITY AND ENVIRONMENT IN PERSPECTIVE

In looking back over the facts presented in this chapter it seems clear that many aspects of human behavior and development—ranging from physical characteristics such as height, weight, and eye and skin color to complex patterns of social and intellectual behavior—are *influenced* by a person's genetic endowment. But it is also clear that great caution is required in interpreting these facts, especially when such interpretations may have dramatic consequences for the lives of other persons. The sad history of rejecting African, Asian, and central European immigrants as "genetically inferior" because of their IQ test performance when arriving in the United States (Kamin, 1974) is an important warning that overinterpretation happens easily. The tendency also has been to assume that any characteristic that is known to be controlled by heredity cannot be influenced by the environment. Many examples demonstrate the fallacy of this assumption. We know, for instance, that temperature of the environment can affect the development of coat color in particular rabbits and the development of the eye in fruit flies, even though these attributes are genetically controlled. More directly related to psychological characteristics, we have seen that special diet can decrease or eliminate the detrimental effects of genetically influenced PKU children. One can also note that, almost invariably, concordance among monozygotic twins decreases when they are reared apart, thereby substantiating the environment-heredity interaction. Similarly, McCall's data suggest that an individual's unique experiences may affect the development of intelligence. Thus, as one writer has put it:

> . . . even a full set of relevant genes does not fixedly determine the corresponding trait. Rather, most genes contribute to determining a *range of potential* for a given trait in an individual, while his past and present environments determine his phenotype (that is, his actual state) within that range. At a molecular level the explanation is now clear: the structure of a gene determines the structure of a corresponding protein, while the interaction of the gene with subtle regulatory mechanisms, which respond to stimuli from the environment, determines the amount of protein made. Hence, the ancient formulation of the question of heredity versus environment (nature versus nurture) in qualitative terms has presented a false dichotomy which has led only to sterile arguments. [Davis, 1970, p. 1280]

Although much is not known about the complex interplay of heredity and environment in determining or limiting human potentiality, it *is* likely that environmental factors play a substantial role in most cases.

SUMMARY

One of the major processes of inheritance explained by Gregor Mendel's experiments with peas is the role of dominant and recessive genes. Heredity involves receiving pairs of genes. For some characteristics, when the genes in the pair are not alike, the dominant one will always display itself over the other. Because of dominant and recessive genes, Mendel distinguished between *genotype,* the entire genetic endowment, and *phenotype,* the outward appearance or manifestation of the genes. Other human characteristics involve the influence of a single gene, such as in some sex-linked characteristics. Still other characteristics, such as intelligence, height, weight, are influenced by a combination of many genes, without one form dominating the others.

Genes influence the growth and operation of certain biological underpinnings of behavior by influencing the structure and action of our neurons, hormones, and enzymes. Experiments with animals using *inbred strains* and *selective breeding* have demonstrated a genetic component in such behaviors as learning ability, sex drive, emotionality, and aggressiveness. Four major methods are used to study genetic determinants in humans: *pedigree analysis, consanguinity studies, the twin study method,* and the *adoptee* or *foster family method.* Each of these methods has interpretative problems in that the effects of the environment are not totally controlled.

Much research involving humans supports the view that there is some hereditary component in IQ although IQ can be changed by environmental influences. Mental retardation may be caused by inherited recessive genes (PKU), abnormalities in the number of chromosomes (Down's syndrome), or aberrations in the sex chromosomes (Klinefelter's, Turner's, and the XYY syndromes. There is also considerable evidence that the closer the genetic relationship between two individuals, one of whom is schizophrenic, the higher the risk that the other will be schizophrenic.

Some patterns of social behavior may be genetically determined. Gottesman studied monozygotic and dizygotic twins and found that six of the twenty-four scales of a personality test as well as IQ were more closely related for monozygotic pairs. Vandenberg inspected numerous studies and concluded that three aspects of human personality have a clear hereditary component: extroversion-introversion, emotionality, and overall activity level. However, all of these factors have been modified in children and adults through environmental change, intervention, or special treatment.

It seems clear that many aspects of human behavior—from physical characteristics to social and intellectual behavior—are *influenced* by a person's genetic endowment and may determine the range of potential for a given person, but the individual's environment will probably determine the actual state within that range.

Perceptual Development

CHAPTER 5

OUTLINE

- SOME BASIC SENSORY AND PERCEPTUAL ABILITIES
  - Taste
  - Touch and Pain
  - Smell
  - Hearing
- VISUAL PERCEPTION
  - Basic Visual Abilities
  - Perception of Distance and Size
  - Visual Constancy
  - Pattern and Form Perception
  - Changes in Attention Deployment
- INTERACTION OF THE SENSORY SYSTEMS
  - Vision-Touch
  - Vision-Audition
- MODIFYING THE PERCEPTUAL ENVIRONMENT
  - Sensory Deprivation
  - Enriching the Environment
- SUMMARY

Almost from the moment of birth stimulation from the environment is constantly being received and organized. This process, perception, is the basis for knowing about the world and, as such, intrigued many of the philosophers who are considered the forefathers of psychology.

What exactly do we mean by perception? The term causes some difficulty because perception overlaps intricately with other processes. Stimulation of the sensory receptors by physical energies from the external and internal environment is known as *sensation* and can be considered only a part of perception (See Table 5–1). The receptors immediately translate stimulation into a code that is carried by the nervous system. The retina of the eye, which reacts to light rays, and the Pacinian corpuscles of the skin, which react to pressure, both translate information into the electrochemical potentials that are nerve impulses. These impulses are relayed to the brain, which acts upon them in various ways. The brain may merely transmit the impulses to the response systems—the muscles and glands—or it may first select, organize, and modify the input. Integration of impulses from the different sense organs is frequently involved, as is a comparison with previous inputs. All of these functions—which improve and change with experience—are labeled perception. It is thus easy to see that perception is interrelated with learning and thinking. How we organize and select is partly based on past learning and labeling of events, and newly processed information from the environment is a basis for further growth.

Today there is considerable interest in early perception, for several reasons: a general curiosity about infancy, attempts to examine the nature versus nurture question, and the belief by some investigators (e.g., Bower, 1974) that development of basic perceptual processes is largely completed during infancy. With an emphasis on early perception, this chapter presents several selected topics which, taken together, paint a broad picture of perceptual development. It begins with a sketch of the basic abilities needed to perceive the world, leaving until later a more extensive discussion of vision, the sense that often is considered the most important in humans. Consideration of intersensory perception—that involving more than one modality—and the effects of environmental modifications on development round out the chapter.

TABLE 5–1
THE SENSES AND RECEPTORS INVOLVED IN RECEIVING STIMULATION

PROPRIOCEPTION (NEAR SENSES)		EXTEROCEPTION (FAR SENSES)		INTEROCEPTION (INTERNAL SENSES)	
Taste	Tongue	Sound	Ear	Balance	Ear
Touch	Skin	Sight	Eye	Body position	Skeletal muscles
Smell	Nose			Organic states such as hunger, thirst	Visceral organs

SOME BASIC SENSORY AND PERCEPTUAL ABILITIES

TASTE

Although there have been few investigations of gustatory stimulation and its development over time, research has established that the neonate is able to distinguish at least salt, sugar, lemon juice, and quinine (Nemanova, as cited by Pick, 1961). An early preference for sugar also has been reported (Pratt, 1954); the neonate relaxes and sucks contentedly when presented with a sweet solution but reacts to salty, sour, or bitter liquids by grimacing and irregular breathing.

Children's taste buds are more widely distributed on the tongue than adults', but it is not known whether and how this affects relative sensitivity (Pick and Pick, 1970). Interestingly, Korslund and Eppright (1967) found that children with the lowest sensitivity had the most enthusiasm and acceptance for food.

TOUCH AND PAIN

Examination of prematurely delivered infants has shown that humans are able to respond to tactile stimulation early in life. Prematures respond to touch with fanning of the toes, slight motor responses, and waking from a half-sleep (Saint-Anne Dargassies, 1966). In the neonate, touching various areas of the body produces many of the reflexes discussed in Chapter 3, including the Babinski reflex, the grasp reflex, and the rooting reflex. An increase in sensitivity to electric shock has been reported during the first few days of life (Lipsitt and Levy, 1959). Sex differences in sensitivity also appear, with the female being more sensitive. This finding holds for older individuals as well as neonates (Pick and Pick, 1970).

We know that sensitivity to painful stimuli is exhibited early, as shown by withdrawal and crying, but it probably is not well developed. The newborn responds to pinpricks, and the number required to cause a reaction decreases over the first few days of life (Sherman and Sherman, 1925).

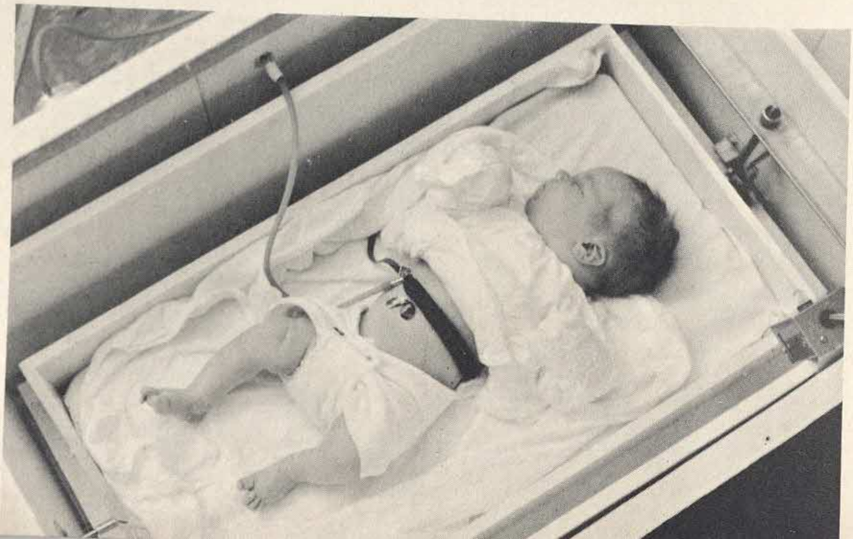
Tactual stimulation becomes increasingly important as young children develop sufficient motor ability to handle objects and navigate the surroundings. They then collect information about the world as they feel the hard floor and soft carpet, the rough stones and the smooth sidewalk, or the round ball and the square block. Under usual circumstances, such perception is the result of the combination of touch and vision. But it is possible to examine the effects of touch only, by asking children to perform various tasks as they handle objects that are out of sight. The ability to recognize objects tactually increases with age as exploration of the objects becomes more systematic (Gliner, 1967).

There is also reason to believe that the sense of touch can be developed more highly when experience and necessity conspire to sharpen it. Thus the blind are better than the sighted in using such cues (Hunter, 1954). Interestingly, blind persons who were sighted until later in life do best of all in tests of tactual perception.

SMELL

The sense of smell, or *olfaction,* appears to be one of the most highly developed senses in the newborn (Rovee, Cohen, and Shlapack, 1975). In a series of investigations infants were placed in a stabilimeter, which registers activity level, with a pneumograph around the abdomen to measure breathing (see Figure 5–1). A cotton swab saturated with an odorant was then placed beneath their nostrils, and changes in activity and breathing were noted. The neonates discriminated the four odors employed, and they showed the usual habituation reaction, that is, repeated presentation of the substances resulted in weaker responses (Engen, Lipsitt, and Kaye, 1963; Lipsitt, Engen, and Kaye, 1963). Very young infants also turn away from the direction in which aversive odors originate, indicating that they can localize odors in space (Bower, 1974). Several European studies show that sensitivity to odors is well developed by age six, continues to improve until middle age, and then declines (McCartney, 1968). Olfactory preferences also exhibit clear-cut changes, and, as might be expected, individuals who have been smokers for over fifteen years have lower sensitivity than nonsmokers.

FIGURE 5–1
Neonate in a stabilimeter. Courtesy Dr. Lewis P. Lipsitt.



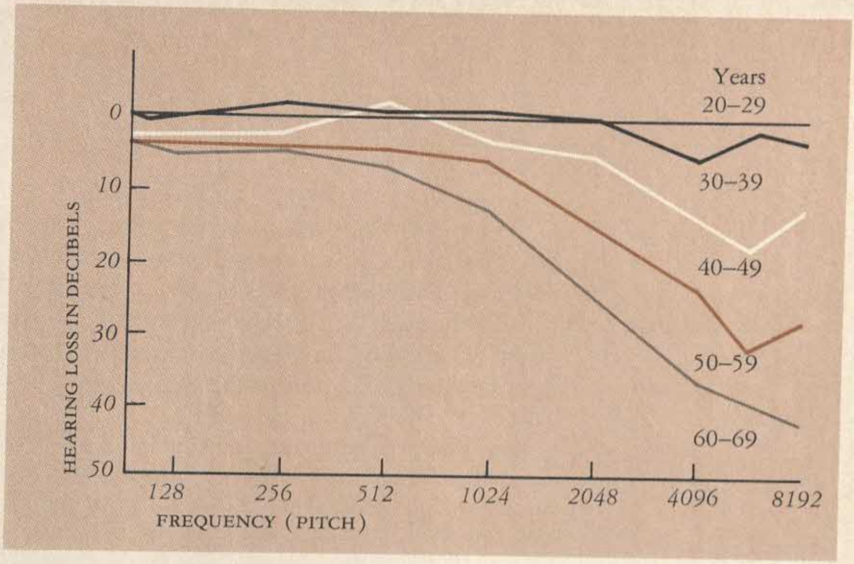


FIGURE 5–2
Audiogram for different age groups, showing hearing loss in higher pitches as people grow older. Adapted from C. C. Bunch, Age variations in auditory acuity. *Archives of Otolaryngology*, 1929, 9, 625–636. Copyright 1929, American Medical Association, by permission.

HEARING

Several reports indicate that the unborn fetus responds to auditory stimulation (Bernard and Sontag, 1947; Forbes and Forbes, 1927; Peiper, 1925). Peiper, for example, reported that many fetuses responded to a loud sound, an automobile horn, with movement.

Early studies of hearing in infants attempted to ascertain sensitivity to gross sounds such as those made by a bell or a tuning fork, but recent investigations have employed better-controlled sound stimuli. Although fluidlike substances in the ear of the newborn may somewhat limit the ability to hear in the first few days of life, even very young infants respond to sound with a variety of responses, such as muscle change, breathing disruption, eye blinking, and changes in heart rate and activity level.

Less well understood are the specific intensities (loudness) and pitches to which responses are made. However, the heart rates of neonates respond to intensities that are in the range of human conversation, so that conversation can serve as stimulation for the very young (Pick and Pick, 1970). Neonates can also discriminate pitch differences in the low-pitch range (Bridger, 1961; Leventhal and Lipsitt, 1964).

At birth infants are able to locate sound that originates directly in front of them and to the right or left. However, they seem unable to locate its *exact* position to the right or left (Bower, 1974).

A study of children from ages five to fourteen showed increased sensitivity to sound until the ages of twelve to thirteen years for both sexes and for white and black children (Eagles, Wishik, Doerfler, Melnick, and Levine, as cited by Pick and Pick, 1970). Then, as seen in Figure 5–2, hearing ability decreases progressively through the adult years, especially for the high pitches.

VISUAL PERCEPTION

In many ways, vision may be considered our most important sense modality. Adults report that they value their eyesight more highly than any of their other senses and use the visual mode to indicate understanding and comprehension that are not, in fact, related to ocular functions (e.g., "I see what you mean!"). It also has been argued that visual stimulation provides an extremely important source of contact between the infant and its environment:

> . . . when he is both awake and contented the young infant's main preoccupation is looking—either in exploring the environment or in examining particular parts of it more carefully. No reinforcement is needed for this response other than the presence of sufficiently interesting sights. [Fantz, 1969, p. 48]

Perhaps for these reasons considerably more work has been accomplished in this area than in any other.

BASIC VISUAL ABILITIES

Visual acuity—the relative ability of individuals to detect both small stimuli and small details of large visual patterns—has been tested in infants through measurements of "optokinetic nystagmus," an involuntary lateral movement of the eyes to the presentation of a moving stimulus. The response is elicited when a recognizable striped pattern is rotated above the infant's head. The width of the separation between the stripes in the pattern can be varied to measure visual acuity, inasmuch as the response will occur only if the infant discriminates the striped pattern. Neonates, one day old, possess eyesight approximately equivalent to 20/150 (Dayton, Jones, Aiu, Rawson, Steele, and Rose, 1964). In terms of the Snellen chart used for older individuals, this means that infants see at 20 feet what adults with normal vision see at 150 feet. This disparity is not fully closed until middle childhood, and visual acuity has been found to increase markedly until ten years of age.

Rudimentary color vision appears to be present shortly after birth. Staples (1937), for example, presented infants with two discs of equal brightness and measured fixation time. Looking behavior was clearly protracted for the colored displays; three-month-olds spent almost twice as much time looking at the colored discs as at the gray ones. In a more recent demonstration, four- and five-month-olds, when presented with lights of different colors, spent different amounts of time looking at them (see Figure 5–3). Interestingly, fixation time was similar to adult ratings of the same lights according to how pleasant they were (Bornstein, 1975).

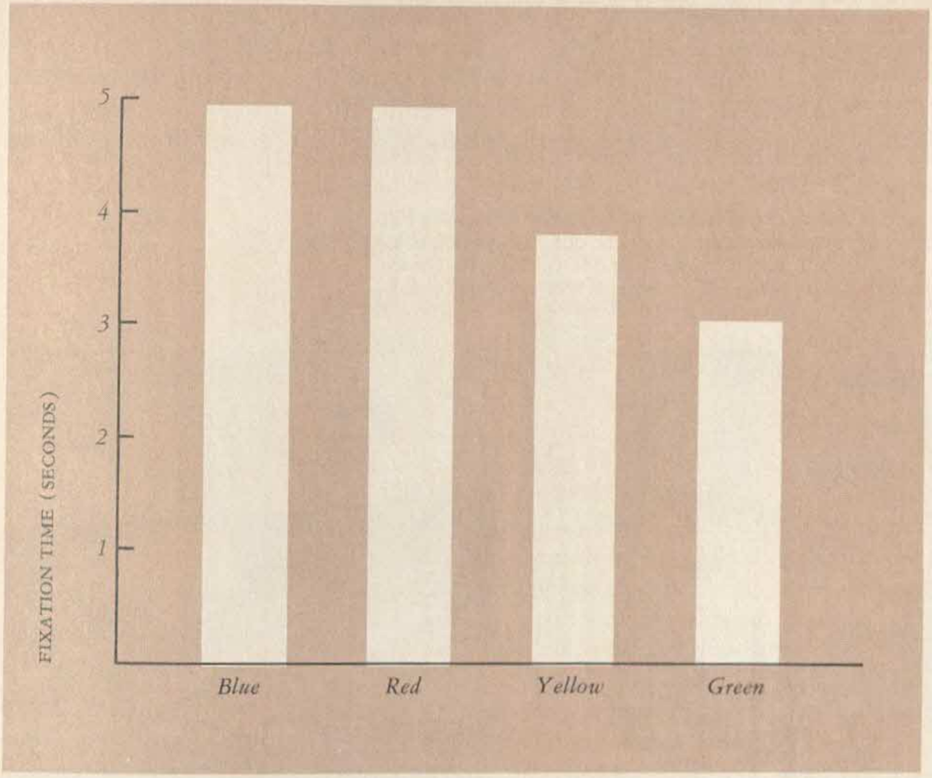


FIGURE 5-3
Average fixation time by four- and five-month-old infants to lights of different colors. Adapted from Bornstein, 1975

A few days after birth neonates are able to track some moving objects, but this response is initially uneven, and focus on the objects is easily lost. However, by about two months of age smooth accurate tracking is evident, due to development of coordination of the muscles of the eye and perhaps to development of brain centers that mediate vision (cf. Bronson, 1974). It is generally believed that movement in the visual field is a strong determinant of attention from the very beginning of life, a topic to which we shall return shortly.

PERCEPTION OF DISTANCE AND SIZE

Some of the most intriguing questions about visual perception have revolved around the ability of organisms to "see" distance. Distance perception requires binocular vision and accommodation, the adjustment of the eyes (chiefly in the lens) to see at different distances. Of the many visual cues for distance, an important one is size of objects: the farther away an object is, the smaller is the image that it projects on the retina of the eye. Another cue is motion parallax: when we are moving, objects closer to us appear themselves to move but distant objects appear stationary. Developmentalists are interested in the ability to use such cues and also in establishing the time at which distance perception begins.

Many years ago it was determined that perception of depth (which is a form of distance perception) is almost as accurate in four-year-olds as in adults (Updegraff, 1930), and recent work has explored the question of whether the ability to perceive depth is present at birth or soon thereafter. Gibson and Walk provide the following overview of the problem:

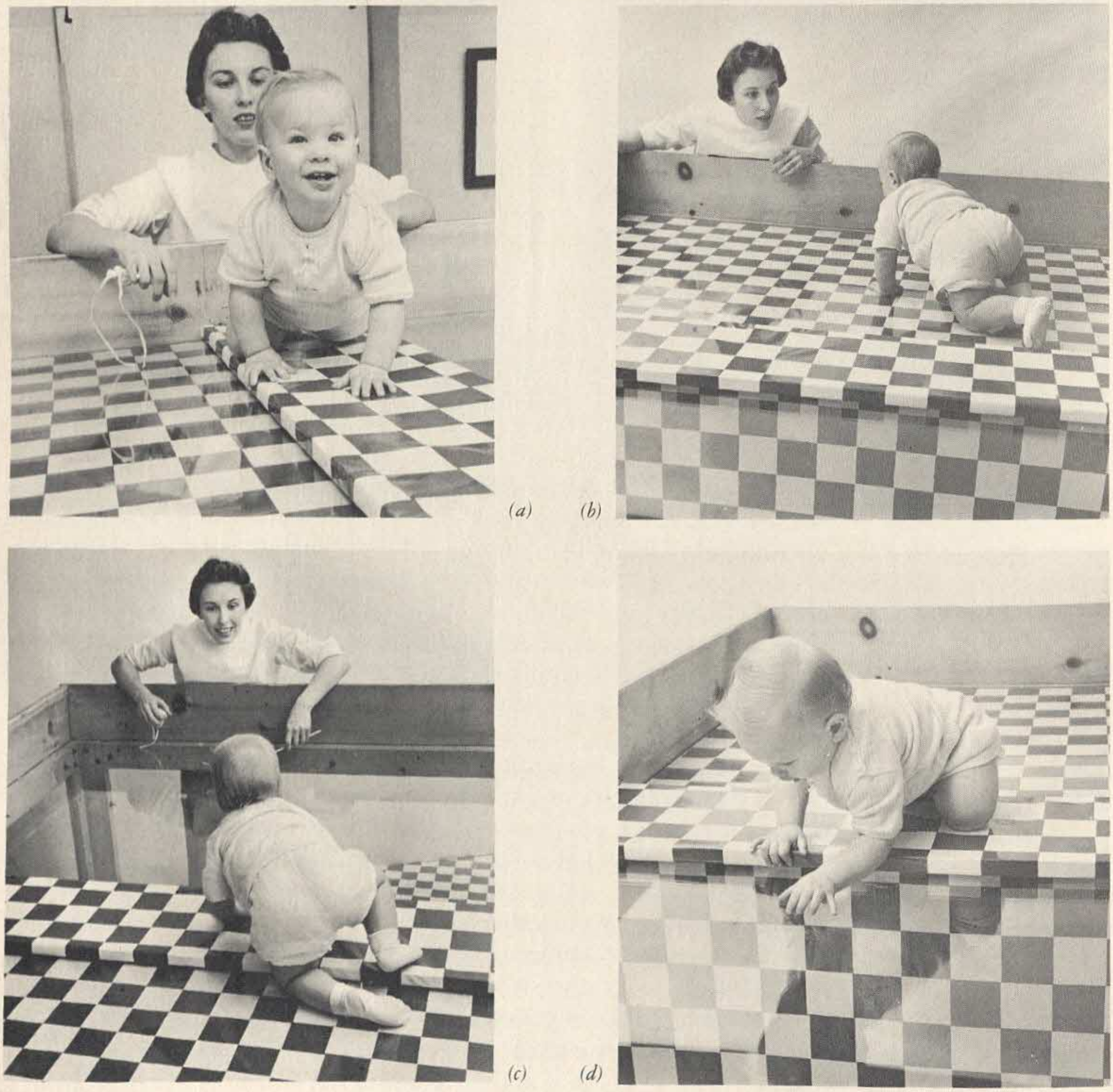


FIGURE 5-4
An infant on the visual cliff (a). He crawls to his mother across the shallow side (b), but refuses to do so on the deep side (c), even though he has tactual evidence (d) that the cliff is solid. From E. J. Gibson and R. D. Walk, The "visual cliff." *Scientific American*, April 1960, p. 65. Photos by William Vandivert, by permission.

> Human infants at the creeping and toddling stage are notoriously prone to falls from more or less high places. They must be kept from going over the brink by side panels on their cribs, gates on their stairways and the vigilance of adults. As their muscular coordination matures they begin to avoid such accidents on their own. Common sense might suggest that the child learns to recognize falling-off places by experience—that is, by falling and hurting himself. But is experience really the teacher? Or is the ability to perceive and avoid a brink part of the child's original endowment? [1960, p. 64]

To investigate the question, Gibson and Walk developed a special experimental setup, which they referred to as the visual cliff. The "cliff," shown in Figure 5–4, is constructed from a heavy sheet of glass with a platform in the center raised slightly above the surface of the glass. The center platform, covered with a patterned material, is wide enough to hold the baby when it is in creeping position. The "shallow" side of the cliff is created by fastening the same patterned material directly beneath the glass on one side of the platform. The illusion of depth is created on the other side of the platform by placing the material several feet below the glass. The infant's mother stands alternately at either the deep or the shallow side and beckons to the child to come to her (Gibson and Walk, 1960; Walk and Gibson, 1961).

Gibson and Walk began by testing thirty-six infants between 6½ and 14 months of age. The results of this initial study were quite clear. Twenty-seven of the infants were willing to crawl off the center onto the shallow sides, but only three ventured into the deep area. The investigators note that a number of infants actually crawled *away* from their mothers when called from the cliff side; others cried, presumably because it appeared to them that it was not possible to reach their mothers without crossing the brink. Clearly, infants old enough to crawl display perception of depth.

VISUAL CONSTANCY

Visual constancy refers to the phenomenon of seeing certain aspects of the environment as constant despite changes that may occur at the retina. For example, people tend to see objects as having constant shapes despite the fact that images of the objects strike the retina in different ways, depending upon the way in which they are presented (Figure 5–5). The same is true for size of objects. That is, people tend to see objects as being of particular sizes regardless of the distance from which they are viewed, even though objects project smaller retinal images as they are moved farther away. It appears that the retinal image either is not used with regard to constancy or is supplemented with other information. Furthermore, some ability to perceive shape and size constancy is evident very early in life.

As an example of early size constancy we can examine an experiment conducted with neonates of approximately ten to twelve weeks of age.

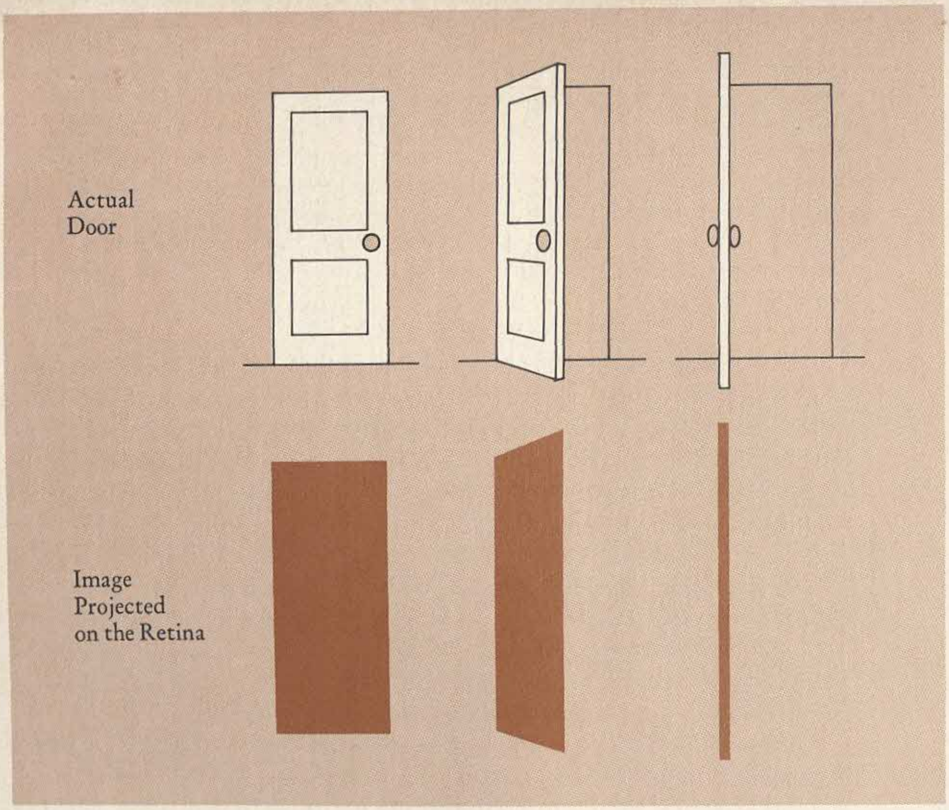
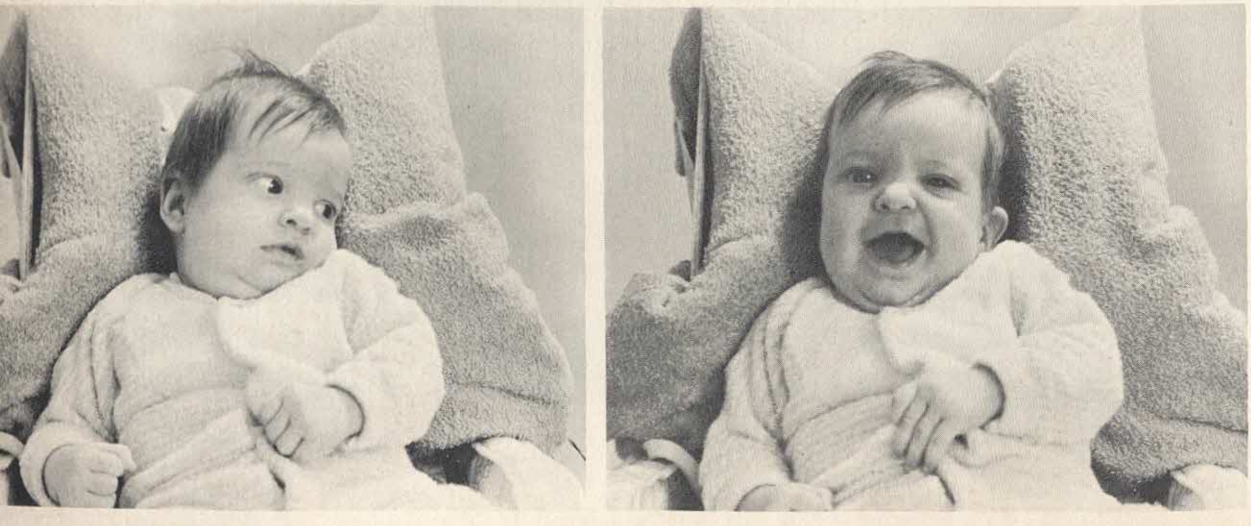


FIGURE 5–5
The door produces a retinal image of different shape in each position. The fact that we continue to perceive it as rectangular despite these variations is an example of shape constancy. Adapted from Gibson, 1950.

FIGURE 5–6
When the infant responded correctly by turning his head (left) he was reinforced by a "peek-a-boo" from the experimenter. Pleasure at the peek-a-boo (right) was sufficient to keep him responding up to twenty minutes. From T. G. R. Bower, The visual world of infants. *Scientific American*, December 1966, p. 87. Photograph by Sol Mednick, by permission.



Employing an ingenious technique, T.G.R. Bower (1966) trained infants to turn their heads leftward when presented with the training stimulus, a twelve-inch cube held three feet away. As shown in Figure 5–6 a correct response earned a "peek-a-boo" from the experimenter. After this training, the young subjects' leftward head turns were regularly produced by the presentation of the training cube.

Having thus constructed a medium by which the infant's behavior revealed something of its perceptual world, Bower proceeded to present cubes of various sizes at different distances. He found that head-turning responses occurred more frequently when the *same size* cube was presented even at different distances. Fewer responses occurred to a cube that differed in both size and distance from the original training cube even though, due to the combination of its specific size and distance, it projected a retinal image size that was identical to the retinal image of the training cube.

The infants' reacting more to the same size cube presented at different distances shows that they possess size constancy. That is, they recognized the object as actually unchanging in its size even though its retinal image size had changed. Size constancy increases with age; children from two to eleven years of age tend to be less likely to underestimate the size of stimuli placed far from them (Beyrl, cited in Wohlwill, 1960). Adults, on the other hand, tend to overestimate the size of distant objects. It is almost as if, having learned that distance makes objects appear smaller, they overcompensate by judging objects larger than their actual sizes.

PATTERN AND FORM PERCEPTION

Another area that has been explored extensively with regard to perceptual development involves various aspects of how pattern, form, and shape are perceived.

Early pattern perception: Fantz's work

The work of Robert Fantz (1958b, 1961) is important in that it took to task the earlier assumption that infants lack the ability to distinguish pattern and form. Fantz used differential attention as an indication that a particular pattern is, indeed, being recognized. He began by building a special infant crib, similar to the one shown in Figure 5–7. Above the infant's head was a plain gray ceiling, on which various pairs of target stimuli were placed. An identical pair of figures, such as two triangles, was hung from the ceiling of the looking chamber one foot apart and one foot above the infant's head. By means of a special peephole in the top of the apparatus, Fantz could tell how much time the infant spent fixating on each of the triangles. Not surprisingly, looking time was equivalent for these two identical figures. But when a "bull's-eye" and horizontal stripes were introduced, it was found that infants above the age of eight weeks preferred the bull's-eye to the stripes. Such a finding could be obtained only if the infant could visually discriminate one pattern from the other.

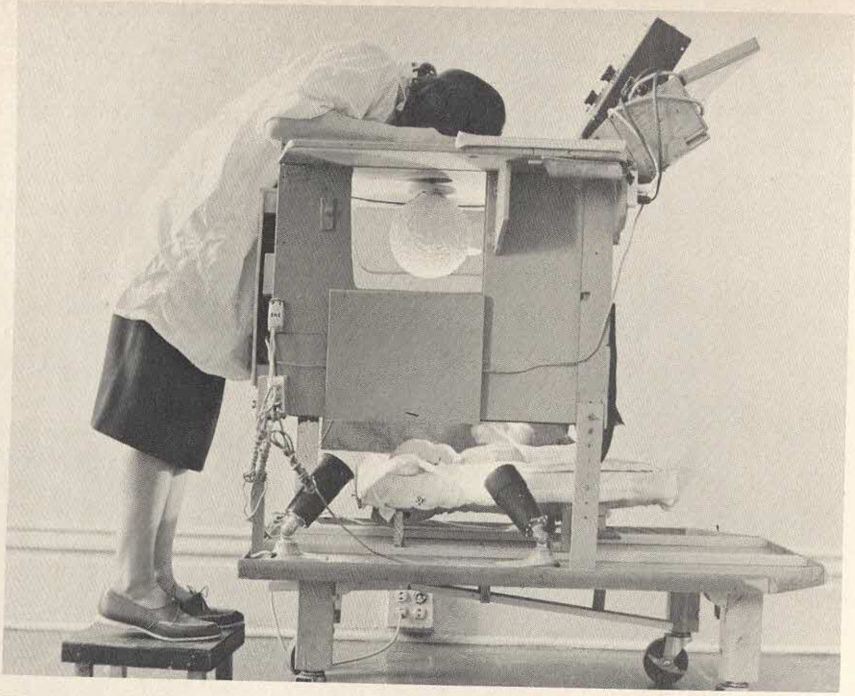


FIGURE 5–7
"Looking chamber" used to test pattern discrimination in human infants. An infant lies on a crib, looking at objects hung from the ceiling, while an observer records the amount of fixation time for each object. From R. L. Fantz, The origin of form perception. *Scientific American,* May 1961, p. 66. Photograph by David Linton, by permission.

Later the procedure was changed somewhat. Under the new rules, only a single stimulus was presented and terminated as soon as the infant looked away. To reduce the likelihood that differences in looking time could be accounted for by very early visual experience and learning, infants under five days of age served as subjects and were compared with older infants. Several other stimulus configurations were also used, including a drawing similar to the human face. Some of the results are shown in Figure 5–8, from which it can be seen that definite "preferences" exist in the very young. Thus, as Fantz has written:

> The results . . . explode both the myth that the young infant is untestable and the myth that there is little to test. It is now difficult to maintain the earlier views that the world of the neonatal infant is a big blooming buzzing confusion. . . . The young infant has a patterned and organized visual world which he explores discriminatingly with the limited means at his command. [1969, pp. 55–56]

Just as important, though, as the fact that any discrimination was displayed are the findings with regard to particular stimuli. Fantz quickly pointed out that infants looked for longer times at complex rather than simple presentations and at social rather than nonsocial configurations (See again Figure 5–8). Other investigators have further explored these findings, trying to ascertain *exactly* what aspects of visual stimuli capture and maintain fixation.

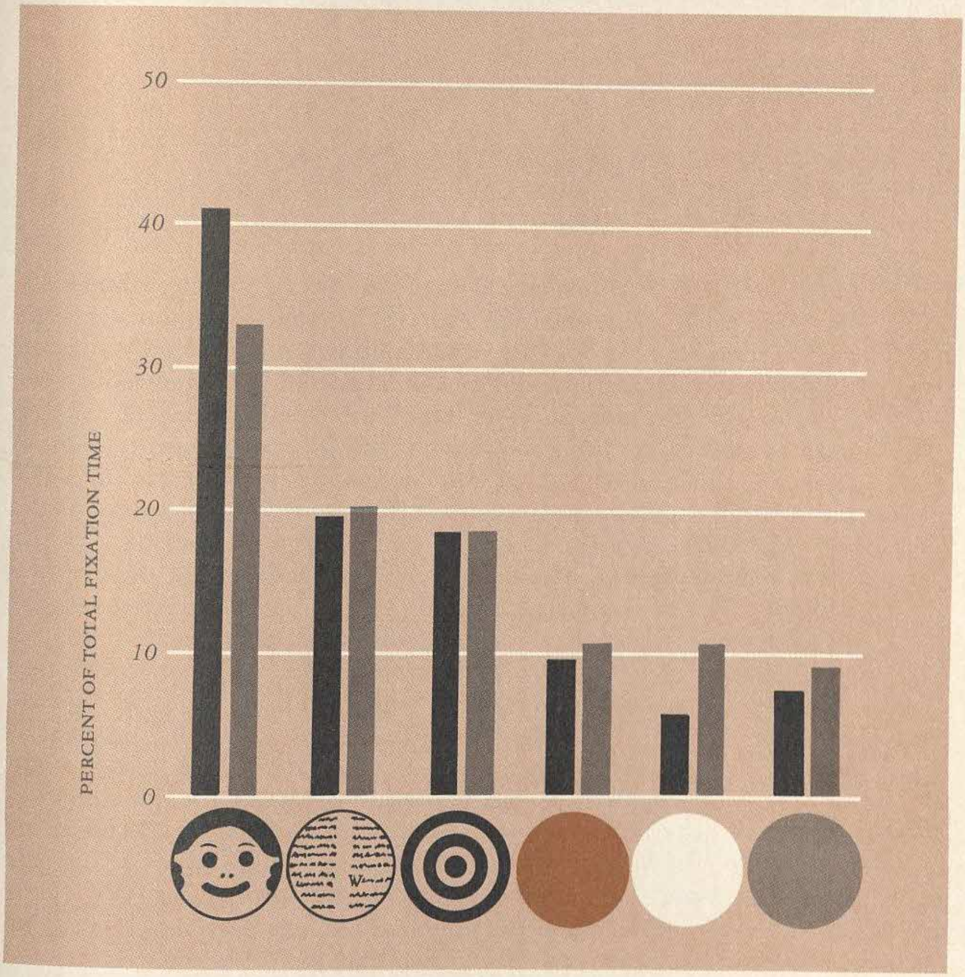


FIGURE 5–8
Fixation time (preference) of very young children to patterned and plain discs. Black bars show the results for those 2–3 months old, gray bars for those more than 3 months old. Adapted from Origin of perception, by Robert L. Fantz. Copyright © 1961 by Scientific American, Inc. All rights reserved.

Stimulus complexity The complexity of a stimulus is usually defined by the number of turns or elements it contains or by the degree of randomness (Figure 5–9). Preference for complexity appears to increase during the first few months of life and is displayed throughout childhood and adulthood (Brennan, Ames, and Moore, 1966; Greenberg and

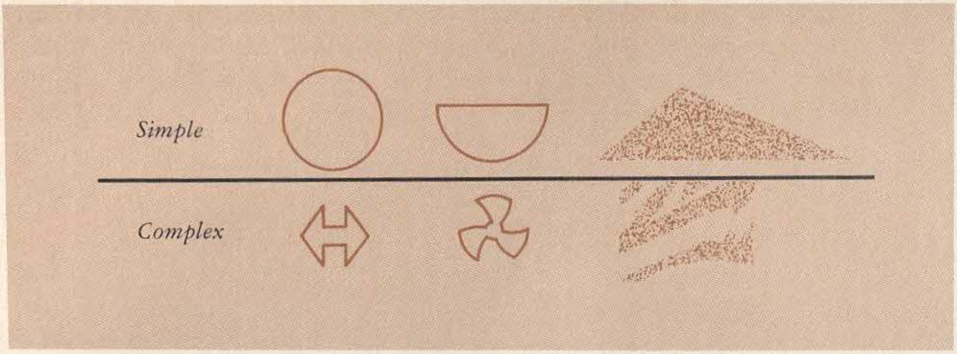


FIGURE 5-9
Examples of simple and complex stimuli.

O'Donnell, 1972; Nunnally and Lemond, 1973). Varying complexity, however, often creates differences in the amount of contour (i.e., outline, border, edge, or black and white contrast), and several investigators suggest that contour is the critical component of *early* preference.

Some evidence does support this view: the amount of time infants gaze at stimuli has been shown to vary with the amount of contour (Karmel, 1969, 1974; McCall and Melson, 1970). The way in which infants scan stimuli also is instructive. In one study, babies were placed in a head-restraining crib in which a visual display—a black triangle on a white field—appeared above their eyes, and scanning of the eyes was recorded by a camera (Salapatek and Kessen, 1966). The infants tended to look at the vertices of the figure, where contrast (that is, contour) is the highest. A similar study uncovered a tendency among three-day-olds to fixate on the border between patches of black and white (Kessen, Salapatek, and Haith, 1965). These results are fascinating because research with animals has revealed that certain retinal cells respond only to border effects. Perhaps specialized human cells are particularly well developed at birth compared with other parts of the visual system and account for the fact that the very young seem almost compelled to gaze at certain aspects of stimuli (e.g., Stechler, Bradford, and Levy, 1966).

In any event, aspects of the stimulus itself—notably movement, complexity, and contour—are strong determinants of early attention, and attraction to them appears to require little prior experience. It is even thought that they underlie the infants' preference for schematics of the human face (cf. Bond, 1972; Haaf, 1974; Haaf and Bell, 1967). The influence of experience soon displays itself, however, in memory for images.

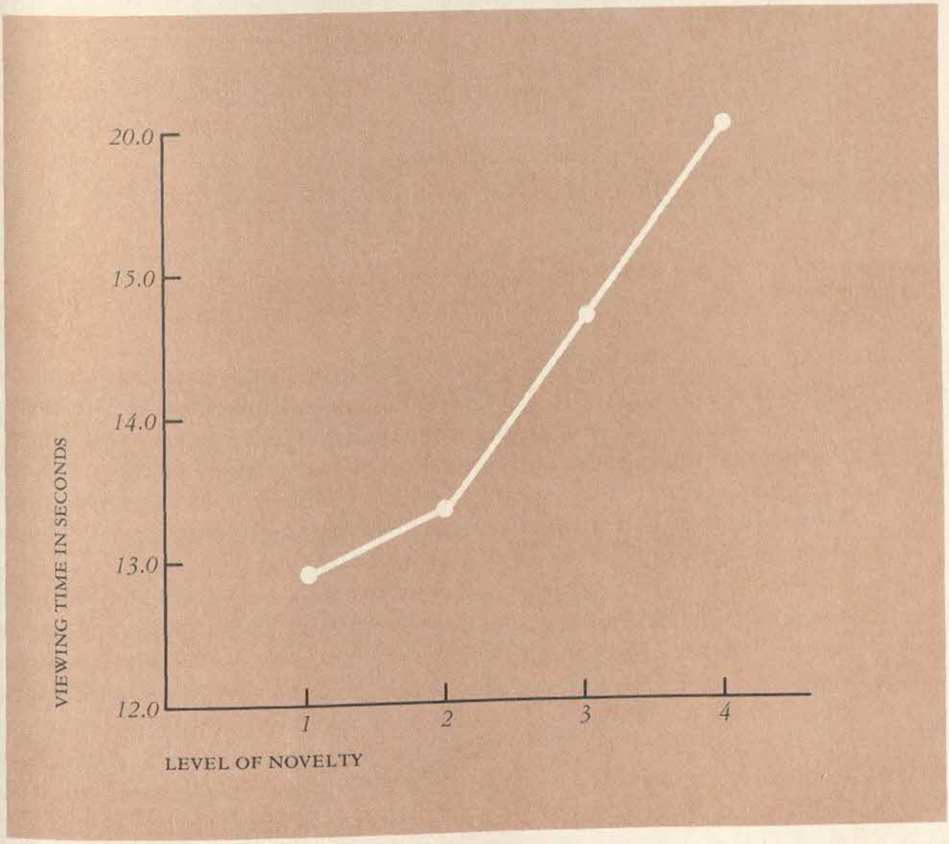
CHANGES IN ATTENTION DEPLOYMENT

Studies of visual memory involve exposing infants to stimulus configurations presented repeatedly (the familiar stimuli) and to novel stimuli, and comparing fixation time. Decreases in fixation time for the familiar stimuli are taken as indication that infants recognize them and are thereby less interested in viewing them. Such habituation occurs by two or three months of age (Bronson, 1974; Caron and Caron, 1969; Fagan, 1970, 1971; Martin, 1975). Furthermore, from age three, viewing time is directly related to degree of novelty (Nunnally and Lemond, 1973), as indicated in Figure 5–10.

As an aside, we mention an interesting exception. One investigation that demonstrates the usual novelty effect in four-month-olds also has shown that premature babies of the same conceptual age (i.e., they were as old as the full-term babies if age is calculated from conception, but they thus were "in the world" longer) did not react differently to novel and familiar stimuli. The authors suggest that premature babies may be deficient in some memory capacity (Sigman and Parmelee, 1974).

In attempting to explain the novelty effect, Kagan (1967) has noted that as infants develop they gradually acquire schemata (mental images or ideas) and that at any one time a particular schema may be familiar or emergent. He argues that the child attends maximally to two kinds of stimuli: those that reflect emerging schemata and those that violate or are discrepant with familiar schemata. The former are said to be in the service of "savoring the stimulus," whereas the latter are in the service of "reducing uncertainty."

FIGURE 5–10
A typical finding of the relationship between viewing time and novelty of the stimulus, indicating that as novelty increases, so does viewing time. From Nunnally and Lemond, 1973.



Nunnally and Lemond (1973), too, emphasize the importance of meaning for older children and suggest that stimuli that provide conflicting information will be looked at for longer periods of time than stimuli that provide less-conflicting cues (Figure 5–11). In one test of this hypothesis, they varied information conflict of stimuli presented to fourth-graders (Lemond and Nunnally, 1974). The results showed that as information conflict increased, so did viewing time for stimuli that had been presented for either four or twelve seconds previously. The authors suggest that stimuli that are both novel and high in information conflict would elicit the longest viewing time because the information conflict would require the most time to solve.

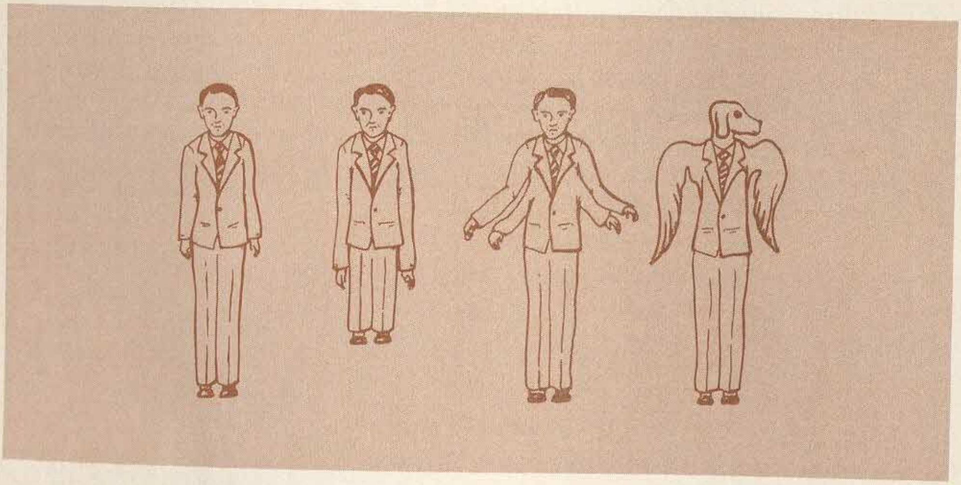


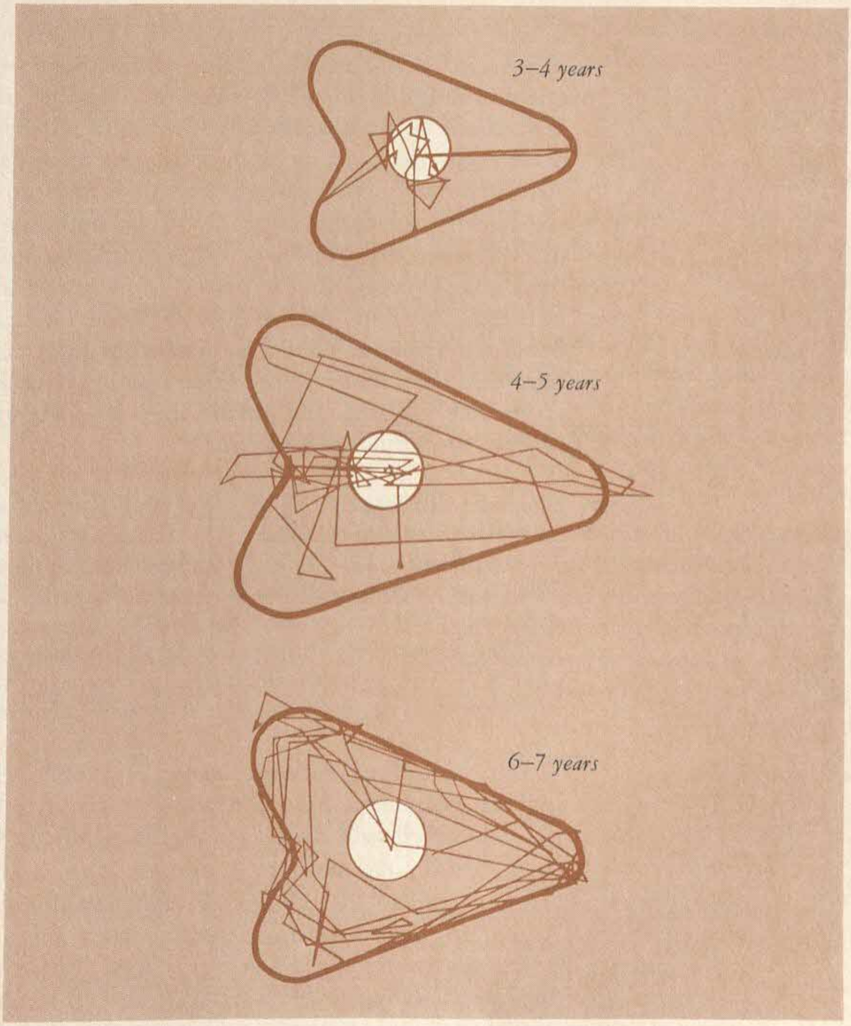
FIGURE 5–11
An example of a set of stimuli varying the degree of information conflict, with conflict increasing from left to right. From Nunnally and Lemond, 1973.

Inherent in this analysis is that attention to visual stimuli changes as children progressively learn about the world. The role of experience also is indicated in the way in which children come to explore displays. As was previously noted, infants initially fixate borders or specific parts of stimuli. Over time, however, they are able to maintain attention for longer periods, and their exploration becomes more systematic between the ages of three and eleven years (Day, 1975).

What is meant by *systematic?* This term refers to the individual visually scanning a display in some task-appropriate way or with some consistent pattern. Figure 5–12 shows the actual eye movements of children at three different age levels; note that the oldest children took in more information and followed the contour of the figure more than did the younger ones (Zaporozhets, 1965). Many other studies show that when the task is to judge the sameness or difference of two visual displays, older children —compared with younger ones—systematically explore the parts of the displays that are most relevant to solving the task (Day, 1975).

In sum, children are born with considerable visual ability that develops rapidly within the first year as the result of both further maturation and experience. Initially, features of the stimulus exert a good deal of control on what is looked at, and limited but somewhat organized information is taken in. Gradually the child becomes less dependent upon the stimulus itself and selects, attends to, and more systematically explores the environment on the basis of previous experience and developing capacities to think and process information.

FIGURE 5-12
Patterns of eye movements showing scanning of visual form at three age levels. From A. V. Zaporozhets, The development of perception in the preschool child. In P. H. Mussen, ed., European research in cognitive development. *Monographs of the Society for Research in Child Development*, 1965, 30, 82-101. Copyright 1965 by the Society for Research in Child Development, Inc. Reproduced by permission.



INTERACTION OF THE SENSORY SYSTEMS

In many situations, perception involves the simultaneous use of more than one sense modality. Eye-hand coordination requires interaction of vision, touch, and proprioception, whereas reading involves vision and audition. Intersensory behavior is not well understood, and for that matter, even a general conceptualization of how it develops is not agreed upon. It is often discussed in terms of increasing ability to integrate the different perceptual systems. But, as we shall see, at least some of the modalities are related at birth, and development entails differentiating them before any more final behavior pattern evolves.

VISION-TOUCH

Bower (1974) provides a fascinating description of the relationship of vision and touch early in life. Newborns, if properly supported, will grasp at tangible objects, indicating that vision and touch are intricately associated. Bower exposed newborns to a "virtual" object; that is, an object that does not actually exist but appears to exist because of a special optical arrangement. The newborns howled when their hands reached the location where the object should have been, although they did not seem disturbed when they simply grasped at empty air in other situations. It is as if they expected something and were upset at the turn of events. At six months of age, this behavior changed in that the babies began to explore. First they looked at their hands and rubbed them together; then they explored the situation visually by moving their heads from side to side; and finally they stopped grasping for the virtual object. According to Bower:

> The older infant knows something is wrong with the visual-tactual coordination and systematically checks the tactual and then the visual halves of it. The responses of older infants are differentiated; they seem to be aware of vision and touch as separate modalities, unlike the younger infants who apparently have a wholistic, unanalyzed awareness of the situation. The younger infants have at their disposal all the behaviors used by the older infants. . . . One must conclude that they have not yet differentiated the visible qualities of an object from its tangible qualities. [1974, p. 116]

But the differentiation of vision and touch leads to another interesting development. At about six months an infant who is grasping a tangible object will drop it immediately when its hand is covered by a cloth. Vision has become dominant at the expense of touch and will remain so even though the dropping response will disappear in time. Adults, for example, who are grasping an object while viewing it through a lens that minimizes its actual size, act as if the object is as small as it appears visually. Developmental studies of localization of touch also give evidence of the increasing dominance of vision. They involve stimulating a point on the skin and requesting individuals, who have their eyes closed, to indicate where they have been touched. Children perform better than adults, apparently because adults place greater reliance upon vision (Dunford, 1930; Renshaw, 1930). Older people are more precise when their eyes are open.

The relationship between vision and touch has been investigated by examining children's ability to explore forms in one mode and then to transfer the information they have acquired to another. Such intersensory recognition improves noticeably throughout the first seven years of life (Abravanel, 1967; Birch and Lefford, 1963, 1967; Zaporozhets, 1965). In one study, for example, three-, four-, five-, and six-year-olds were allowed to touch abstract forms without seeing them, and then they were asked to identify them visually. Children at the younger two ages could recognize only about half as many of the forms as could the two older groups (cf. Zaporozhets, 1965). As noted earlier in our discussion, exploration of objects both visually and tactually becomes more systematic with age, and so one would expect that more information is taken in, leading to better recognition and transfer between modalities.

VISION-AUDITION

Vision and audition, too, seem to be correlated at birth, because when infants hear something they orient their eyes in the direction from which the sound emanates. Aronson and Rosenbloom (1971) conducted an experiment similar to the virtual object study of Bower in that it demonstrated the reactions of three-week-old babies to a situation in which their usual expectations were not met. Mothers sat behind a window in front of their infants and spoke to them through a microphone. Their voices were then displaced so that the sound seemed to come from a few feet to the right or left of the mothers. The infants definitely were disturbed by the situation. Later it was shown that young infants orient midway between the location of the mouth and the sound, whereas older infants look at the mother but turn their heads so as to maximally pick up the sound (Aronson and Dunkel, cited in Bower, 1974). As with Bower's subjects, the older babies appeared to differentiate the two modalities. However, in this case, as visual-auditory perception continues to develop, probably up to the age of ten years, it is the auditory cues that appear to become more salient (Birch and Belmont, 1965; Rudnick, Sterritt, and Flax, 1967).

MODIFYING THE PERCEPTUAL ENVIRONMENT

Many different kinds of investigations have been conducted in an attempt to better understand the influence of the perceptual environment on development. In a general way, they can be categorized into *deprivation* and *enrichment* studies. The former involve examining nonhuman animals or humans after they have experienced an atypical lack of sensory stimulation. Enrichment studies, as the name indicates, involve examination after exposure to a particularly sensory-rich environment.

SENSORY DEPRIVATION

For ethical reasons, deliberate sensory deprivation is not carried out with humans, but studies have been conducted with humans who lived in darkness for years as a result of cataracts and then had their vision restored by surgery. These patients appeared to have difficulty estimating distance and identifying complex shapes. There is lack of agreement, however, over the validity of the findings (Epstein, 1964).

Depriving animals of sensory stimulation very early in life provides clues to the necessity of such experience for normal perceptual development. In some cases, deprivation has not had strong consequences. For example, Lashley and Russell (1934) found that rats reared in darkness from birth to one hundred days of age were able to jump from one platform to another as accurately as those reared under normal conditions. Although their experiment met with some criticism, other research has corroborated the findings (Nealey and Edwards, 1960; Walk and Gibson, 1961), and also has shown that depth perception in chicks is not greatly impaired by early deprivation (Fantz, 1958a; Kurke, 1955).

But other perceptual abilities, at least in certain animals, are affected by deprivation. In one study, a chimpanzee was subjected to tactual deprivation (Nissen, Chow, and Semmes, 1951) by covering his legs and forearms with cardboard. After thirty months the cardboard was removed and his reactions were compared with those of a normally reared chimp. He was less able to locate the spot where he was pinched, and appeared not to feel a pinprick. Additionally, he required more than two thousand trials to learn to turn his head to the right or left depending on which hand was touched; the control animal took two hundred trials.

In another investigation, two chimps were reared for the first sixteen months of their lives in total darkness except for a few minutes of light each day required for their care. Subsequent tests revealed that they responded to light—their pupils constricted and followed a flashlight—but that they did not respond to objects unless the objects touched their bodies, nor did they blink at motion toward their faces. One of the animals, named Snark, never overcame these deficiencies and even deteriorated after months of a lighted environment. What was the cause of his visual retardation? The investigator, A. H. Riesen, noted:

> There had been no previous evidence that stimulation by light is essential for the normal growth of the primate retina or optic nerve. It was a surprise to find that, while the eyes of these chimpanzees remained sensitive to light after 16 months in darkness, the retina and optic disk in both animals did not reflect as much light as normal chimpanzee eyes do. Snark later developed a marked pallor of the optic disk in both eyes. There is other evidence suggesting that fish and amphibians, at least, need light-

> stimulation for normal eye development. So the physiological effects of the lack of light may be part of the explanation for Snark's loss of visual function. . . . We now have clear evidence from further experiments with chimpanzees that not merely light itself but stimulation by visual patterns is essential to normal visual development. [1965, p. 78]

Taken together, these studies demonstrate that without environmental interaction, many perceptual systems deteriorate or fail to develop properly.

ENRICHING THE ENVIRONMENT

If sensory deprivation sometimes has adverse effects, sensory enrichment has been shown to have a positive influence. One of the first to emphasize the crucial role of the environment, D. O. Hebb (1949), conducted a series of experiments involving a variety of tasks and found that rats reared in a diverse visual setting were superior to those reared with little visual stimulation.

And, as we have seen, if the effects of deprivation sometimes display themselves in the biological systems, so does the influence of enrichment (Rosenzweig, 1966; Rosenzweig, Bennett, and Diamond, 1972). Rats reared in small groups with the opportunity to interact with wheels, ladders, boxes, and the like, along with free exploration and training in mazes, actually showed increases in the weight of the cerebral cortex and changes in the chemistry of the brain.

Working with human infants, White and Held (1966) compared the effects of four kinds of environments on the development of visually directed reaching. Using the hand under the guidance of the eyes, a facility that is said to distinguish human from nonhuman animals, ordinarily is mastered by about the fifth month of life (White, 1975). White and Held found, however, that it may emerge as early as three months under certain conditions. The uniform and somewhat bland surroundings of a typical hospital nursery provided a baseline against which the influence of three modified environments were tested. The first modification involved twenty extra minutes per day of handling by the nurses. Under the second modification plan, numerous forms and colors were displayed above the cribs to heighten interest and increase hand movements. Moreover, extra opportunities for head and neck movements and extra handling were provided. Under the third modification program, pacifiers were mounted on the rails of the cribs just within the infants' sight to encourage grasping (see Figure 5–14). Extra handling was also included in this program. The results showed that the second and third environments speeded up reaching, a finding that is important because manipulating objects is considered central to the development of intelligent behavior.

Because various investigations have shown that perceptual stimulation is necessary for normal development and that enrichment can lead to optimal growth, educators and parents are now focusing on providing extra toys and objects with which infants and very young children can

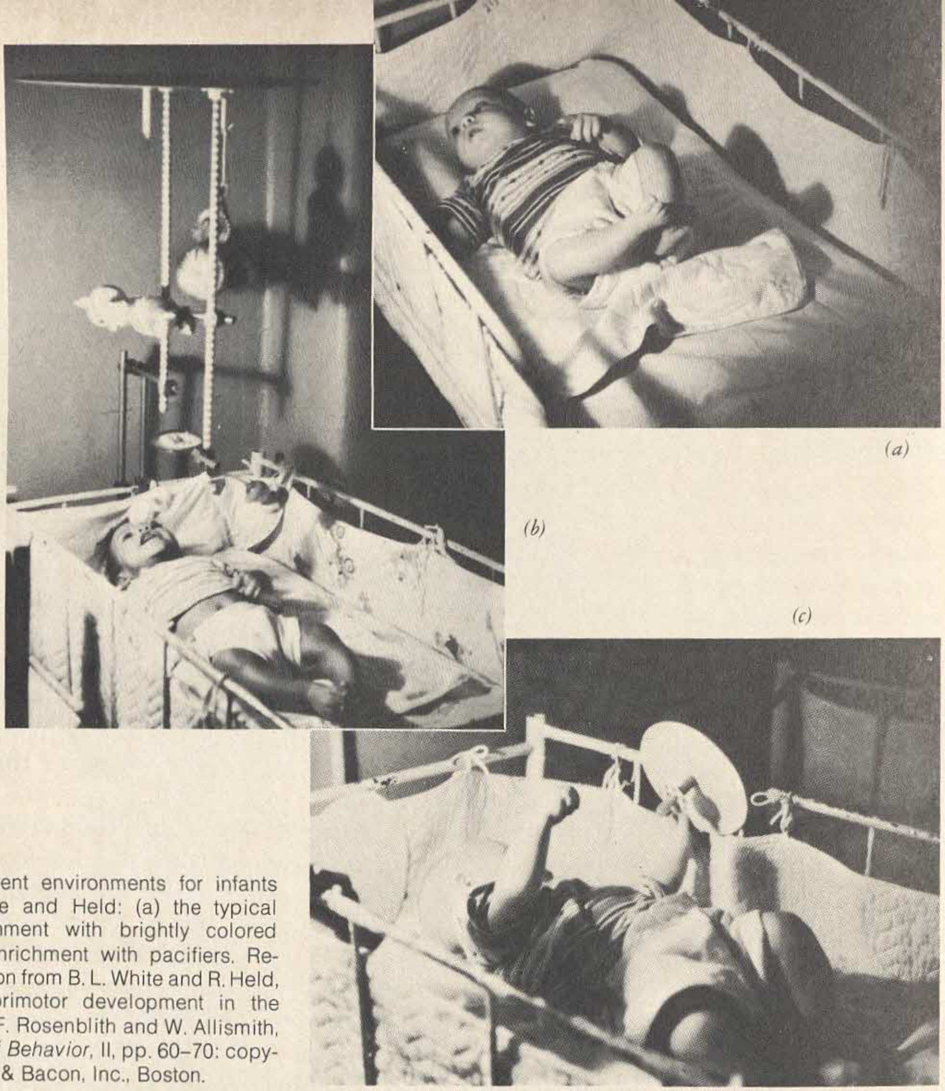


FIGURE 5–13
Three of the different environments for infants employed by White and Held: (a) the typical nursery, (b) enrichment with brightly colored objects, and (c) enrichment with pacifiers. Reprinted by permission from B. L. White and R. Held, Plasticity of sensorimotor development in the human infant, in J. F. Rosenblith and W. Allismith, eds., *The Causes of Behavior*, II, pp. 60–70: copyright 1966 by Allyn & Bacon, Inc., Boston.

interact. While probably not harmful, unless perhaps the child is inundated with stimulation, it would seem that this practice requires detailed consideration of the way in which children develop (cf. White, 1975). At the very least, toys must be suitable to the manner in which information is perceptually being taken in.

SUMMARY

Perception is the complex process of receiving and interpreting information that comes by way of the various sensory receptors—the proprioceptors, exteroceptors, and interoceptors. As such, it is intricately involved with learning and thinking.

There is much interest today in understanding perception in the very young child. Human infants arrive in the world with considerable ability to take in information systematically. For example, they respond to touch, distinguish some tastes, and differentiate and localize odors. Many of these abilities develop rapidly during the first year, continue to grow at a slower pace during childhood, and then decline at different ages throughout adulthood.

Of all the perceptual systems, vision has been studied most extensively. Basic visual ability is more sophisticated at birth than was previously thought, and it develops quickly. It is difficult to demonstrate when certain abilities first appear, but the neonate fixates and tracks moving objects, at least to some extent, and responds to form and pattern. Color vision and visual constancy have been demonstrated during the first year of life. The same is true for distance perception. Gibson and Walk's "visual cliff" studies being a dramatic demonstration.

With regard to vision, the characteristics of stimuli exert much control over what the young infant will fixate. Movement, complexity, and contour are especially compelling aspects. Infants also are attracted to the human face, although movement, complexity, and contour may underlie this.

Stimulus control is soon modified, however, by experience. In general, infants and children are attracted by novel rather than familiar visual displays, and by stimuli that provide conflicting information. The way in which children visually explore objects also changes. Examination becomes more extensive and follows systematic patterns that are task appropriate. Clearly, learning and thinking are now intertwined with perception.

The development of intersensory perception is not well understood, although it is thought to primarily involve integration of the perceptual systems. But experiments with infants show that different systems (i.e., vision and touch, vision and sound) are related at birth, and that differentiation may be an important part of the growth of intersensory perception. In any event, one system may become dominant over another, at least for certain tasks.

Modification of the environment has provided striking demonstration that perceptual development is a function of the interaction of biological capacities with experience. Depriving animals of sensory stimulation can result in detrimental biological change and perceptual functioning. Enrichment, on the other hand, can lead to analogous improvement. Applying the principles of these findings to child rearing requires detailed analysis, however.

Learning Processes

CHAPTER

6

OUTLINE

- LEARNING BY CLASSICAL CONDITIONING
  - Watson's Influence
  - Developmental Trends in Classical Conditioning
- INSTRUMENTAL LEARNING
  - The Nature of Reinforcement
  - Principles of Reinforcement
  - The Use of Punishment
- OBSERVATIONAL LEARNING
  - Generalized Imitation
  - Social Learning and Modeling
  - The Forms and Sequence of Observational Learning
  - Selection 3—Learning through Modeling
- COMPLEX PROCESSES IN LEARNING
  - Learning to Learn
  - Mediation and Discrimination
  - Memory
  - Hypothesis Testing
- SUMMARY

Learning is one clear basis for the many changes that occur throughout the lifespan. Illustrations abound. Through learning children acquire vocabularies, bicycle-riding skills, table manners, prejudices and preferences, fearfulness and daring, ambition and sloth.

What is *learning?* The following general definition seems to capture its important features:

> Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of native response tendencies, maturation, or temporary states of the organism (e.g., fatigue, drugs, etc.). [Hilgard and Bower, 1966, p. 2]

Psychologists recognize at least three basic ways in which learning occurs: classical conditioning, instrumental learning, and observational learning. Although these may overlap in any one situation, it is helpful to examine them independently.

LEARNING BY CLASSICAL CONDITIONING

At the end of the nineteenth century the Russian physiologist Ivan Pavlov began a series of investigations on the digestive processes of dogs. His experimental procedure involved introducing meat powder into the mouths of his subjects and then measuring the flow of various digestive juices. During the course of this work, Pavlov ran into an irritating problem. The dogs often appeared to anticipate the food, so that salivary flow began even before any meat powder had been introduced. When earnest efforts to eliminate this troublesome interference failed, the decision was made to study it systematically. Pavlov reasoned that inasmuch as untrained dogs salivated when meat powder was placed on their tongues, salivation was a natural or *unconditioned response* (UCR). But salivation that came to be elicted by the sight of the food had to be acquired by environmental events and was thus a learned or *conditioned response* (CR).

This reasoning led Pavlov to investigate the manner in which conditioned responses are formed. He presented the sound of a metronome (*conditioned stimulus,* or CS) followed in a few seconds by food (*uncon-*

ditioned stimulus, or UCS). At first, no salivation occurred until the UCS was presented. Then, after a number of presentations, saliva was secreted during the time interval before the meat powder was presented, apparently in response to the CS. This salivation was the learned or conditioned response. With such a *classical conditioning* procedure Pavlov taught dogs to salivate to an impressive array of environmental stimuli, including a rotating disk and a light. And his investigations went far beyond merely demonstrating the phenomenon, for he was also interested in the specific circumstances under which conditioned responses were formed, modified, and weakened.

Generalization and discrimination To develop a conditioned response, it is necessary to follow the conditioned stimulus repeatedly with the unconditioned stimulus; with repeated pairings the conditioned response develops gradually. But conditioning would have few implications for understanding the development of behavior if the particular CS used in training were the only one that could produce the CR. Classical conditioning is not limited in this way, however. Stimuli that are similar to the one used during training also can produce the conditioned response. The greater the similarity between the new stimulus and the original conditioned stimulus, the greater the degree to which they are substitutable. This is referred to as *generalization.*

Another phenomenon, *discrimination,* can also occur; it involves the subject's learning to respond to a specific stimulus and not to other, similar ones. Discrimination is the result of the UCS being paired with a particular stimulus but never with others. In an experiment by Pavlov, for example, an animal was always presented with meat powder, the UCS, after the presentation of a luminous circle but never after the presentation of an ellipse. Soon the dog regularly salivated to the circle but not to the ellipse.

Extinction And finally, it has been observed that just as responses can be conditioned to neutral stimuli, so can they be eliminated by repeated presentation in the absence of the UCS. This gradual diminution of a conditioned response is called *extinction.*

WATSON'S INFLUENCE

One of the first psychologists in the United States to take seriously the proposition that Pavlovian, or classical, conditioning may have implications for the development and modification of human behavior was John Watson, the father of modern behaviorism. Watson (1914) was convinced that given certain conditions and stimuli, responses are orderly and predictable. He advocated that learning principles be applied to the development of behavior and, in fact, was enthusiastic about the possible outcome of such an endeavor:

> Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and

> train him to become any type of specialist I might select—doctor, lawyer, merchant, chief and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. [Watson, 1914; reprinted 1958, p. 104]

Watson instigated several studies with young children that illustrate the early application of conditioning procedures. The most famous of these is Watson and Rayner's case of "little Albert," published in 1920.

Albert was an eleven-month-old child with no detectable fear except loud sound, such as that made by striking a steel bar behind him. Assuming that the sound was a UCS that elicited fear, Watson and Rayner tried to show that they could induce or condition the fear of a white rat (a CS) in Albert by systematically pairing exposure to the animal with the sound. After a series of seven such presentations, the rat, which previously had not elicited any fear, produced a fairly sharp avoidance reaction which included crying and attempts to escape from the situation.

In a follow-up study, Mary Cover Jones (1924) showed that fear responses can be partially extinguished by procedures similar to conditioning. Her subject, Peter, was a boy of two years and ten months, who had previously developed a severe fear reaction to furry objects. Jones first arranged for Peter to play, in the presence of a rabbit, with three children who exhibited no fear of the animal. The treatment appeared to be working well when a setback occurred, due to Peter's illness and accidental exposure to a large dog. Jones then decided to treat the boy with a combination of exposure to fearless others and *counterconditioning*. The latter involved moving the animal progressively closer to Peter while he ate some of his favorite foods, thus pairing the feared stimuli with pleasantness. The boy's fear diminished with this treatment until he was able to hold the rabbit by himself.

DEVELOPMENTAL TRENDS IN CLASSICAL CONDITIONING

Psychologists have been interested in the demonstration of classical conditioning in infancy in order to determine whether such learning operates as a developmental process early in life. Initial studies provided some positive results, but they were justifiably criticized on the grounds of poor method. In the mid-1950s, valid experiments gradually erased the remaining doubt. A variety of responses—such as blinking, crying, heart rate, head turning, fear responses, eye movement, and sucking—can be classically conditioned during the first few weeks of life (Brackbill and Koltsova, 1967; Fitzgerald and Porges, 1971; Stevenson, 1970). In some cases, however, conditioning required many trials, and it has been suggested that susceptibility to such learning increases with age. Age differences have been reported, but they are too inconsistent to provide any definite conclusions (Reese and Lipsitt, 1970).

Nevertheless, the substance of a few of the conditioning studies with older children is instructive with regard to understanding the development of behavior. As we would expect, associative learning as it occurs in classical conditioning takes on complex aspects as children advance in age. For example, Russian psychologists have demonstrated the role of language as a classically conditioned "second signal system." If a light has been conditioned to food, the word "light" also may come to signal food; this requires only that the word be associated with the first signal (i.e., the light). In one experiment (Degtier, cited by Brackbill and Koltsova, 1967), children ranging in age from 1½ to 3 years were taught conditioned responses to auditory stimuli; for example, the sound of a bell and the word "bell" were used. For the older subjects, the words alone came to elicit the conditioned responses. This study is not unlike those done in the United States many years ago, in which subjects were trained to contract their pupils when they heard the word "contract." Apparently, thinking the word elicited the pupillary responses (Berlyne, 1970).

It appears that many of the meanings that are attached to people and events also are developed through this form of associative learning. The manner in which this may occur during childhood has been demonstrated in a series of experiments by Nunnally and his associates (Nunnally, Duchnowski, and Parker, 1965; Nunnally, Stevens, and Hall, 1965; Parker and Nunnally, 1966; Wilson and Nunnally, 1971). To illustrate the typical findings, we shall consider the work of Nunnally, Duchnowski, and Parker (1965).

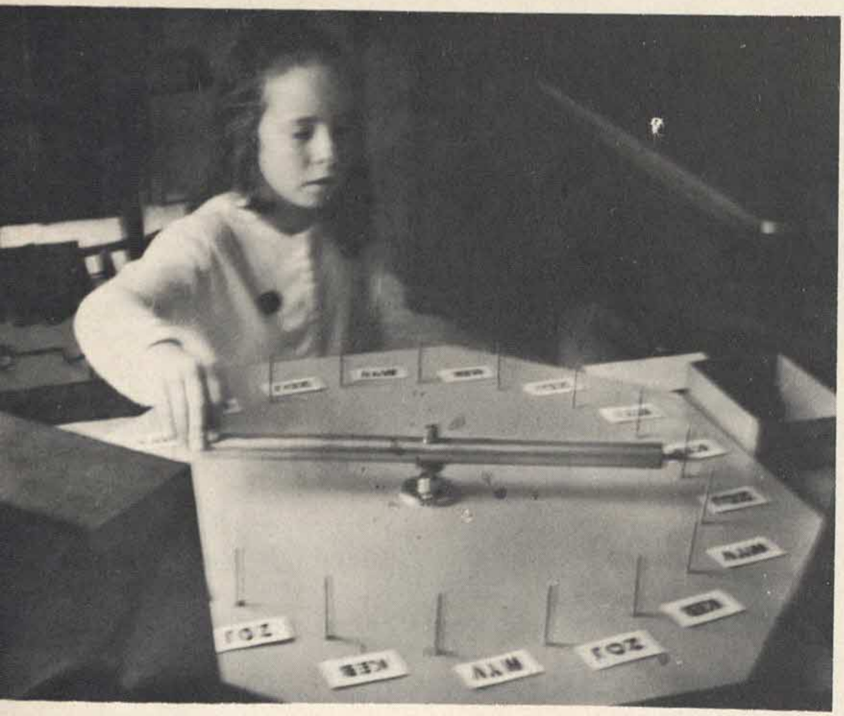


FIGURE 6-1

A child playing the spinning-wheel game used to condition reward value in the research of Nunnally and his associates. Courtesy Dr. Jum C. Nunnally.

Elementary school children were asked first to play a spinning-wheel game similar to the situation shown in Figure 6–1 in which one of three nonsense syllables (ZOJ, MYV, GYQ) appeared in each of the eighteen possible stopping points on the wheel. Each child was permitted to spin the wheel thirty times; one of the syllable stopping points led to a reward (two pennies), one led to no consequences, and one led to a negative outcome (the loss of one penny). The major purpose of the experiment was to show that the three initially neutral nonsense syllables could take on positive or negative value through pairing them with various outcomes. To show that such conditioning had in fact occurred, three measures were employed; we shall consider one of them, a *verbal evaluation task.*

This task involved showing the child three stick figures with blank faces. One of the three nonsense syllables previously associated with rewards, punishments, or neutral events was placed below each of the figures. The child was told that each of the syllables was the name of the "boy" with which it was now associated, read a list of pleasant and unpleasant adjectives, and asked to attribute each to one of the boys. For example, the subject was asked "Which is the *friendly* boy?" or "Which is the *mean* boy?" The measure clearly suggested that the positive and negative meanings had been conditioned: 4.77 (out of a possible 5) positive evaluations were attributed to the positively conditioned stimulus, .23 positive evaluations to the neutral stimulus, and none to the negative stimulus.

The concept of conditioned reward value, illustrated in Nunnally's research, may be applied to the development of a host of social behaviors and attitudes. For example, the manner in which complex attitudes may be conditioned is illustrated in an experiment by Staats and Staats (1958). Their subjects, college students, heard various proper names (such as Tom and Bill) and national names (such as Swedish and Dutch) associated with either positive or negative words (e.g., *gift, sacred,* and *happy* versus *bitter, ugly,* and *failure*). The students were told to try to learn the CS words—i.e., the proper names—by looking at them while pronouncing the auditorily presented UCS adjectives aloud and to themselves. A relatively short period of such conditioning, the purpose of which was not known to the participants, produced dramatic differences in the attitudes that were subsequently expressed when the subjects were asked to indicate how they felt about the names. The results (Figure 6–2) suggest that positive and negative prejudices can be classically conditioned. Other evidence indicates that this process may operate early in life. A series of studies (Edwards and Williams, 1970; Renninger and Williams, 1966) has shown that white children of preschool age have begun to associate white figures with positive adjectives and black figures with negative ones. This is not to say, of course, that prejudice is learned only through classical conditioning; undoubtedly other learning processes are also involved.

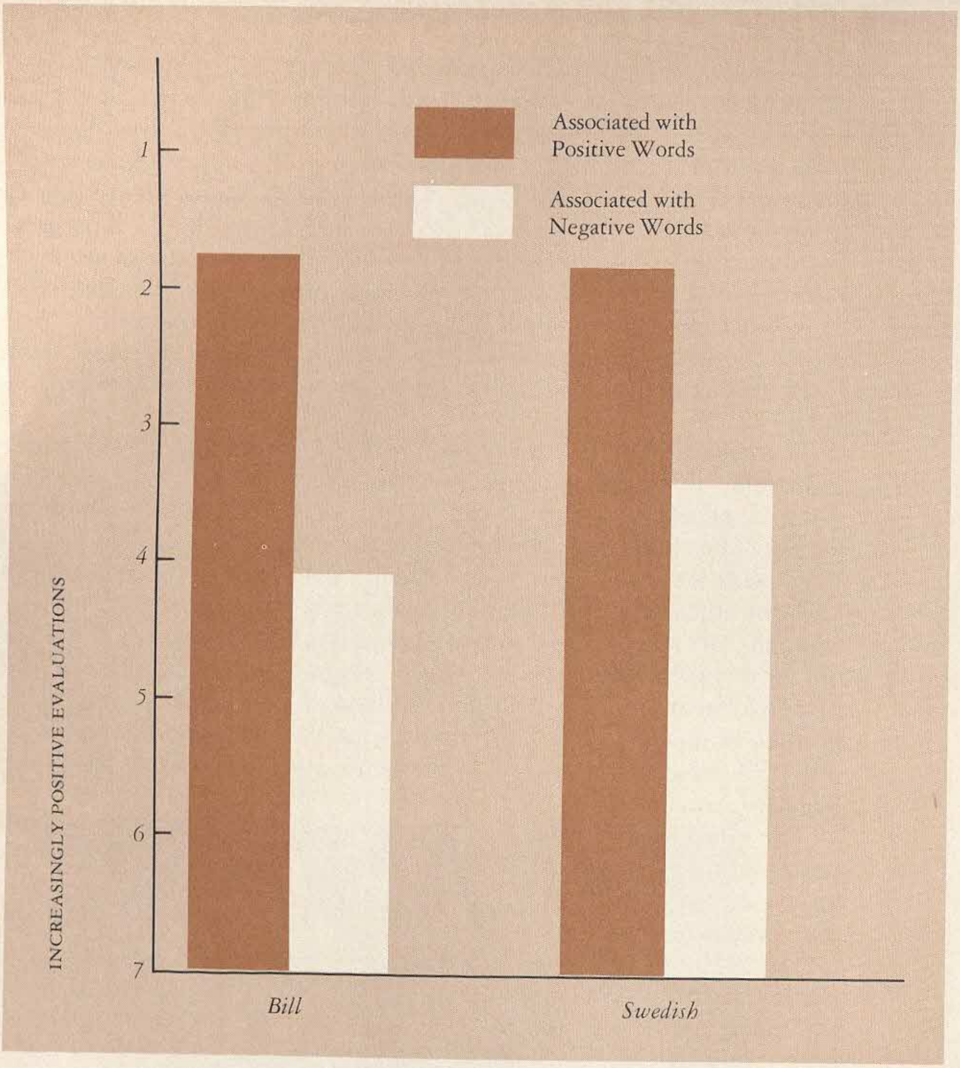


FIGURE 6–2
Mean conditioned evaluations of "Bill" and "Swedish," according to whether the names had been associated with positive or negative words. Data from Staats and Staats, 1958.

INSTRUMENTAL LEARNING

Unlike classical conditioning, in which behavior is elicited by some identifiable stimulus, instrumental learning focuses on the consequences (rewards and punishments) that follow behavior. The pioneer investigator in this area was E. L. Thorndike.

In a typical experiment, Thorndike (1898) placed a cat into a slatted cage with food located outside; thus, escape was potentially followed by food reward. The cat had to perform a particular response, such as pulling a cord or pressing a lever, to open the door; by virtue of the creature's high level of activity, sooner or later it "accidentally" performed the act and succeeded in escaping. Thorndike observed that on subsequent trials, "All the other nonsuccessful impulses will be stamped out and the particular impulse leading to the successful act will be stamped in by the resulting pleasure . . ." (1898, p. 11).

From such observations, Thorndike formulated a general law, the *law of effect,* applicable to the behavior of all organisms:

> Any act which in a given situation produces satisfaction becomes associated with that situation, so that when the situation recurs the act is more likely than before to recur also. Conversely, any act which in a given situation produces discomfort becomes disassociated from that situation, so that when the situation recurs the act is less likely than before to recur. [Thorndike, 1905, p. 203]

Thorndike endeavored to apply the law of effect and several other principles derived from his research to a number of practical human problems. He published over five hundred articles and books, among them a fairly complete volume on experimental psychology and several books focusing on educational matters (cf. Joncich, 1962). In one such volume, written for teachers and setting forth his philosophy of educational psychology, he reflected:

> Human nature does not do something for nothing. The satisfyingness and annoyingness of the states of affairs which follow the making of the connection are the chief forces which remodel man's nature. Education makes changes chiefly by rewarding them. The prime law in all human control is to get the man to make the desired response and to be satisfied thereby.
>
> The Law of Effect is the fundamental law of learning and teaching. . . . By it animals are taught their tricks; by it babies learn to smile at the sight of the bottle or the kind attendant, and to manipulate spoon and fork; by it the player at billiards or golf improves his game; by it the man of science preserves those ideas that satisfy him by their promise, and discards futile fancies. It is the great weapon of all who wish—in industry, trade, government, religion or education—to change man's responses either by reinforcing old and adding new ones, or by getting rid of those that are undesirable. [Cited in Joncich, 1962, pp. 79–80]

Extended and elaborated, the law of effect is central to instrumental learning. Examples of instrumental behaviors (also called *operants*) include doing homework, playing chess, driving a car, and dressing oneself. Completion of any one of these acts results in some consequences. For example, driving a car may result in viewing the beautiful countryside, avoiding unpleasant work at home, or getting a speeding ticket. Future behavior is influenced by these consequences: positive consequences (reinforcement) increase the likelihood that the behavior will occur in the future, whereas negative outcomes (punishment) decrease the likelihood that the behavior will occur again.

Positive and negative reinforcement Positive consequences can occur when something "good" or of value follows a behavior. This is known as *positive reinforcement* and is exemplified in the above situation when driving an auto results in viewing the beautiful countryside.

But there is another way in which reinforcers operate to strengthen behavior. *Negative reinforcement* consists of increasing behavior by the removal of an aversive stimulus. If a child is afraid of being outside in the dark (an aversive situation), and he or she runs home quickly, thereby removing the aversive stimulus, the frequency of running in that situation will increase. The phenomenon has been shown in the laboratory by presenting an electric shock to an animal and terminating the shock when the animal performs a predetermined response. The animal learns to complete the act as soon as the shock begins. In a somewhat different situation, when a prescribed behavior will prevent the shock from coming on at all, the animal learns an avoidance response. Analogously, the child in the above example might learn to run home even before the sun sinks over the horizon.

FIGURE 6–3
Parental affection is a powerful positive reinforcer for most children. Photo by Nancy Hays. Monkmeyer Press Photo Service.

Primary and secondary reinforcement The concept of reinforcement as applied to instrumental learning is intertwined with the concept of need-reduction. All organisms have basic needs or cravings rooted in their biology, such as the need for food, sexual satisfaction, or avoidance of pain. Behavior that results in the reduction of these needs is reinforced and will gradually increase. Receiving food is a *primary reinforcer* because it reduces a primary need for subsistence. Thus we might expect that if a hungry child's crying is followed by mother bringing food, the frequency of crying when hungry will go up.

But not all reinforcers are related directly to satisfaction of biological needs. Consider the work by Silverstein and Lipsitt (1974) in which infants received food paired with a tone whenever they touched a target. Later the infants more frequently touched a target that produced this tone than a target that produced a different tone previously not associated with food. The first tone had thus become a reinforcer in itself—a *secondary reinforcer.* It was shown, too, that the phenomenon occurred only among infants who responded during the first training phase.

In this basic way, then, the mother who feeds her child is associated with need reduction and her presence may gradually become a secondary reinforcer. Now crying may be reinforced merely by mother's coming to the child. Moreover, many other behaviors, such as babbling or saying "Mama," can be similarly increased by mother's attention. The concept of secondary reinforcement is an important one, as it attempts to explain how new behaviors can be built on the relatively small set of behaviors with which the child is born. Thus, work that earns money, daring that brings a smile from father, and studying that results in an "A" are strengthened because money, father's approval, and social recognition of certain achievements have become reinforcing events. There is no doubt that a vast array of stimuli function as reinforcers for human beings. Because all individuals in a particular culture have virtually identical biological needs and share many similar experiences, we can safely infer that certain objects or events are reinforcing to most of them. On the other hand, only a careful analysis of the individual's past can clearly determine which additional events serve as effective reinforcers.

PRINCIPLES OF REINFORCEMENT

Extinction Extinction is the weakening of a learned operant due to the lack of reinforcement. If an instrumental response has been strengthened by providing reinforcement, and if the reinforcement is then withheld, there is soon a decrement in response rate. The mechanism parallels that found in classical conditioning when the CS is presented alone without the UCS after the conditioned response has been acquired. The degree to which an organism resists extinction is one indication of the strength of the conditioned response.

Quite striking behavior changes can come about through extinction. Take the hypothetical case of a six-year-old girl whose disruptive behavior in the classroom is being reinforced by the attention it evokes from the teacher. Should the teacher refrain from attending to the child subsequent to her disruptive acts, the behavior would drop off over time.

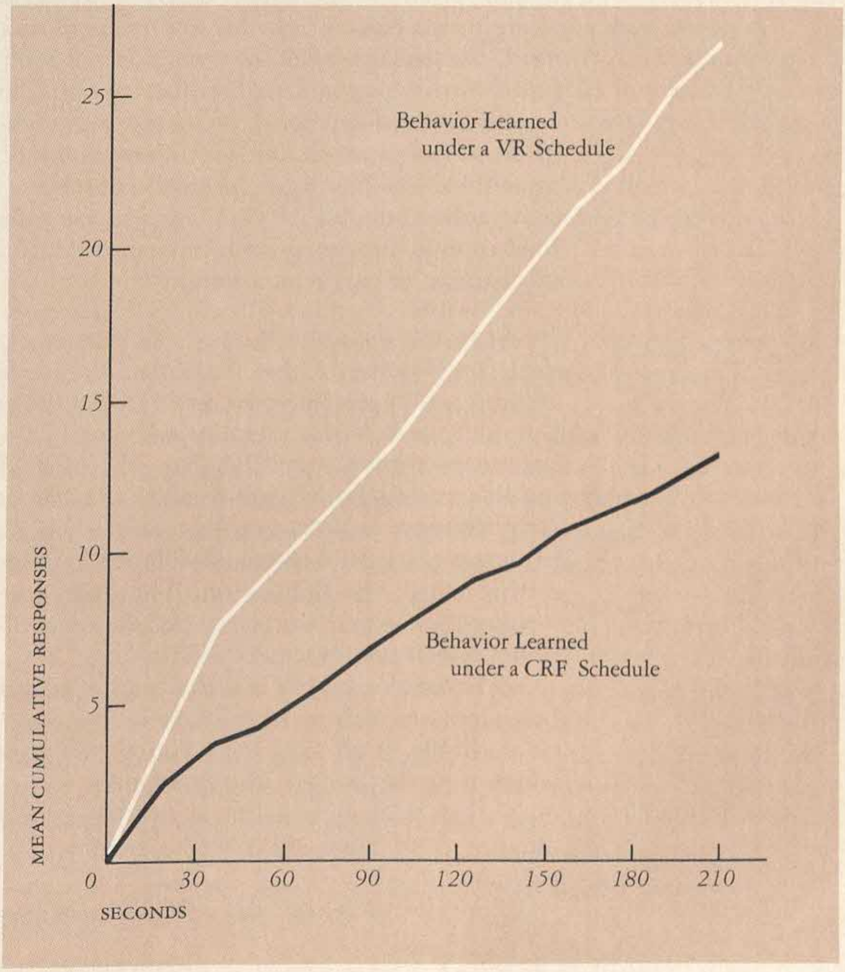
Schedules of reinforcement Much of what is known about instrumental learning is owed to B. F. Skinner, who detailed this kind of learning through experimental work in the laboratory. Some of Skinner's research with animals has shown that the effects of reinforcement can depend upon the scheduling or patterning with which the reinforcer is given. The most obvious schedule is to give a reinforcer every time the desired behavior is performed. This procedure, referred to as a *continuous reinforcement* (CRF) schedule, rarely parallels the experiences that are found in actual life situations. Investigators thus have been especially interested in the effects of reinforcement that is given on a *partial* or intermittent schedule.

Partial reinforcement may be set up according to a *fixed interval* of time (FI schedule). With this kind of schedule, the subject is reinforced only for the first correct response emitted after a prescribed lapse of time. *Fixed ratio* (FR) schedules, in contrast, are those in which a response is reinforced only after it has occurred for a fixed number of times without consequences—e.g., a reinforcer after every fourth response. Studies with both animals and humans suggest that FR schedules can be made to produce considerably higher rates of responding than either CRF or FI schedules. Moreover, an experimenter may begin an organism on a particular schedule and slowly decrease the ratio of unreinforced to reinforced responses until the organism is rewarded as infrequently as one response in every thousand.

Reinforcement also may be provided on variable schedules—that is, after a variable time lapse (variable interval, or VI) or a variable number of unreinforced responses (variable ratio, or VR). The subject therefore never learns exactly when reinforcement will occur. Responding usually becomes very steady, with the rate depending upon the length of the time interval or the ratio first employed. The VR schedule is particularly potent for evoking high rates of responding. It is as if the subject knows that the more frequent the responding, the more frequent the payoff, even though it is not possible to predict when the payoff will come. Variable schedules are probably extremely common in human affairs.

A subtle finding concerns the relationship between resistance to extinction and the schedule of reinforcement employed during learning. Although organisms learn more rapidly under a CRF schedule, their behavior persists longer after the termination of reinforcement when they originally learned under a partial schedule. It has often been colorfully noted that the compulsive gambler persists because he is the victim of intermittent reinforcement, but the phenomenon also has important, if less dramatic, implications for child rearing. An example is provided in an investigation with preschool children in which the correct response consisted of picking up a ball and moving it to a different location (Bijou, 1957). One group of children was given a trinket for each of five consecutive responses (a CRF schedule); the second group was given the same number of reinforcers for five randomly selected responses out of a series of twenty-five trials (a VR schedule). During the extinction phase, when no trinkets were provided, the children trained on the CRF schedule responded less frequently than those exposed to the partial schedule (See Figure 6–4).

FIGURE 6–4
Mean number of responses (cumulative) during the extinction period in Bijou's experiment. Adapted from S. W. Bijou, Patterns of reinforcement and resistance to extinction in young children. *Child Development,* 1957, **28**, 47–54. Copyright 1957 by the Society for Research in Child Development, Inc. Reproduced by permission.



Such findings suggest that continuous reinforcement during childhood may have potentially dangerous implications for behavior during adulthood. According to Lundin (1961), for example:

> . . . we find that those who break down easily or are readily set to aggression were as children too often *regularly* reinforced. Every demand was granted by their acquiescent parents. In youth they may have been so sheltered that failure was unknown to them. As a result these children have never built up a stability of response which would enable them to undergo periods of extinction and still maintain stable activity. The poor resistance to extinction is exemplified in their low frustration tolerance. As adults they are still operating like the rat who was reinforced on a regular schedule. [P. 82]

But there is also the other side of the coin. Variable schedules, by virtue of their ability to produce both high rates of responding and considerable resistance to extinction, are probably responsible for many inappropriate but persistent behavior patterns. A child may begin by requesting a cookie from his or her mother, a request that she turns down the first time. But the youngster has been reinforced for such behavior in the past and persists, perhaps speaking more loudly and becoming more annoying. If the weary parent now gives in, and continues to do so from time to time on future occasions when nagging becomes intolerable, she has begun to build a durable behavior pattern that may survive even staunch efforts to become more firm. At best it will take a long time to extinguish such harassment; at worst, quite tyrannical behavior may be taught unwittingly.

Discrimination and generalization Instrumental learning is unlike classical conditioning in that particular stimuli do not directly elicit the response; they do, however, come to "set the occasion" for a response. Consider the behavior typically exhibited by the rat in a Skinner box, a specialized experimental chamber. The animal has little difficulty learning that pressing a bar will result in the delivery of a pellet of food. If reinforcement is then provided only when the bar is pressed in the presence of a light, the animal will soon limit his responding to the time during which the light is on. The light has become a *discriminative stimulus* for the behavior; it enables the rat to discriminate the condition under which reinforcement will occur.

Such stimulus control is at the heart of adaptive functioning, for even behaviors we wish to strengthen in a variety of situations would not be desirable in all situations. Eating, for example, is a vital behavior which must be brought under stimulus control; although we want to encourage children to eat meat and vegetables, we do not wish them to attempt to eat string, sticks, or the contents of the bottles in the medicine cabinet.

In the case of the rat whose behavior is under the control of the light, suppose the intensity of the light is varied somewhat. The number of bar presses will now be greater for intensities that closely match that of the training light and will decrease as the intensities are progressively different. In other words, *generalization* occurs. This phenomenon, which allows the animal to apply learned response to somewhat different situations, is found across many species, including human beings.

Chaining and successive approximation Instrumental (or operant) conditioners have addressed themselves to the manner in which sequences of behavior are learned and maintained through reinforcement. They have shown that animals can be taught long chains of behavior leading to reinforcement—this is accomplished by having the reinforcer follow the last act in the sequence, then having it follow only if the last two acts are performed, then the last three, and so on backward down the sequence. Animals have been taught fascinating chains of behavior in this way, such as climbing a ladder, crossing a bridge, descending a ladder, crawling through a tube, and pressing a bar for food (e.g., Pierrel and Sherman, 1963). Although it obviously is not always necessary to use such a *chaining* procedure with verbal human beings, the technique has proven useful in building behaviors in the very young or in the retarded.

Even so, chaining requires that the desired acts must occur before they can be reinforced. If they do not, they must be shaped by *successive approximation*. As the name implies, this involves a successively changing reinforcement contingency. At first a large class of responses that has some relevance for the ultimately desired behavior is reinforced. Then the contingency is gradually altered so that reinforcement is given only for closer and closer approximations of the desired behavior. In teaching a pigeon to stand in one small corner of its cage, for example, the investigator might begin by rewarding the bird for standing anywhere on the left-hand side of the cage. After a while, the bird will spend most of its time there, so the investigator can now safely narrow the contingency down to one quadrant, one-half of the quadrant, and so on. One such progression illustrating the basic principle of successive approximation is shown in Figure 6–5.

An important variant of successive approximation involves building the components of the behavior that is finally desired. In teaching language to a woman who was a mute psychotic, Neale and Liebert (1969) first rewarded imitation of single syllables (e.g., "Buh," "Mmm"), then words (e.g., "Bread," "Milk"), then abbreviated sentences ("Milk, please"), and finally complete sentences ("May I have some bread, please?"). Such a procedure has often been shown to be highly effective. If the investigators had waited for the patient to produce a full sentence before issuing any reward, little progress would ever have been made.

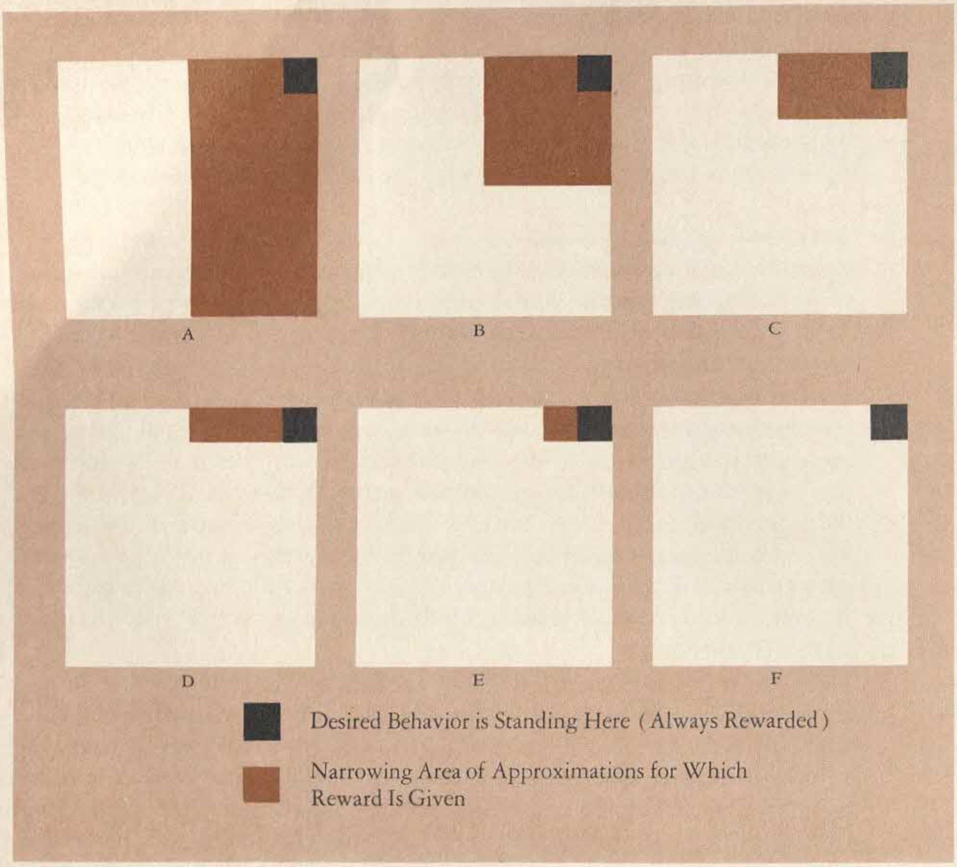

A
B
C
D
E
F
Desired Behavior is Standing Here (Always Rewarded)
Narrowing Area of Approximations for Which Reward Is Given

FIGURE 6-5 A diagram representing the principle of successive approximation.

THE USE OF PUNISHMENT

Punishment obviously plays an important role in the practices of many parents. According to one survey, virtually all parents (98 percent) used it at least occasionally (Sears, Maccoby, and Levin, 1957). Whereas reinforcement is most effective in building new patterns of behavior, the effects of punishment are primarily *suppressive;* when punishment "works," it reduces the likelihood of certain noxious or potentially dangerous responses. In this section we shall focus upon recent evidence that outlines the circumstances under which punishment is most and least likely to be an effective means of inhibiting unacceptable behavior by children.

The timing of punishment Perhaps no factor is more important in the naturalistic use of punishment, particularly with the young child, than its timing, relative to an act of transgression. If a child acts in an extremely antisocial way, whether by hitting a younger sibling, stealing, lying, or committing an act of vandalism, some time inevitably will pass before the transgression is detected. Even after detection, an extended waiting period may be present before potential punishment, as in the familiar "Wait till your father comes home!" It is therefore important to determine the relationship between the timing of punishment and its effectiveness.

As a general rule, mild punishment will be maximally effective if it occurs at the outset of a deviant act, or while the act is occurring, and will be much less effective if periods of considerable delay are introduced. There are many theoretical reasons that can explain why this is so, but most involve the following two points.

First, a transgression usually is an instrumental response, producing some positive outcome for the child. Taking forbidden candies or cookies provides the pleasure of eating these treats, and a temper tantrum in a department store may effectively intimidate one's mother into buying a five-dollar notebook. These outcomes are reinforcers for the child, and the longer they are held or savored, the more likely they are to "balance out" the negative experience of punishment.

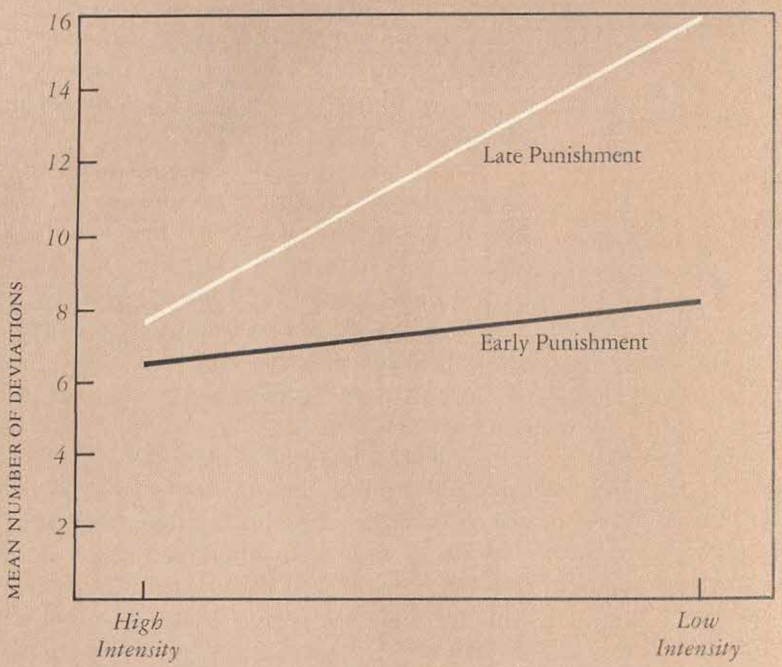
Second, very late punishment may be confusing in its purpose, at least for very young children. A young boy who seriously breaks some rule subsequently may try to "be good all day" (perhaps to forestall punishment). If he is then punished in the evening for the morning's transgression, the parents have created a situation in which negative consequences follow some very desirable behavior which they would otherwise wish to encourage and reinforce.

Effects of punishment as a function of its intensity Another factor that plays an important role in the effectiveness of punishment is its intensity. Research with laboratory animals has shown consistently that very mild levels of punishment usually do *not* permanently eliminate responses; however, moderate punishments often tend to suppress the behaviors that they follow and quite intense punishments are very effective in completely eliminating certain kinds of well-practiced responses (Solomon, 1964).

Although ethical considerations obviously preclude using very intense punishments with human subjects, a few carefully designed studies with children have varied the intensity of a punishing noise (e.g., Parke, 1969, 1970). These investigations clearly mesh both with other laboratory studies and with certain naturalistic investigations: ". . . the overall findings from field and laboratory studies generally support the expectation that high-intensity physical punishment in most circumstances more effectively inhibits the punished behavior than does punishment that is less intense" (Parke, 1970, p. 86).

One particularly striking finding is the manner in which the intensity and timing of punishment interact. Parke (1970) has presented evidence to show that late punishment is less effective than early punishment

FIGURE 6–6
The relationship of intensity and timing of punishment. Adapted from R. D. Parke, The role of punishment in the socialization process. In R. A. Hoppe, G. A. Milton, and E. C. Simmel, eds., *Early Experiences and the Process of Socialization* (New York: Academic Press, 1970). By permission of the author and Academic Press.



only when the punishment is relatively mild but that children are quite responsive to late punishments of high intensity. This relationship is shown in Figure 6–6.

The adult-child relationship The effectiveness of a particular punishment will depend on many other factors. For example, research (Aronfreed, 1968; Parke, 1967; Whiting, 1954) suggests that punishment from an adult who is usually rewarding and nurturant to the child is likely to be more effective than the same punishment from one who is usually cold and distant. What is more, explaining the reason for punishment increases its effectiveness (Parke, 1969). Certain types of consistency also are critical; adults who practice what they preach are likely to be more effective in their reprimands than those who do not (Mischel and Liebert, 1966). On the other hand, the parent who follows punishment with a display of affection toward the errant child may counteract the impact of the punishment and will probably strengthen the undesirable response (Parke, 1970).

All of these findings, along with those mentioned above, provide clues as to how caretakers can maximize the effects of punishment. An additional point is worth mentioning here. In most instances when punishment is used, it is desirable that the child learn another response to substitute for the punished one. For example, if a child is consistently fighting with peers, it might be desirable if the fighting were reduced and cooperation were substituted. The optimal way of achieving this would be to punish aggression and simultaneously reinforce cooperation.

OBSERVATIONAL LEARNING

Observational learning, as the name implies, refers to learning that occurs through viewing the behavior of others, the others being presented either live or symbolically in writing, films, television, and the like. Its importance in human affairs was recognized even in ancient times; more than two thousand years ago Aristotle wrote that "man is the most imitative of living creatures, and through imitation learns his earliest lessons." Despite this propitious beginning, however, observational learning played a peculiarly minor role in the thinking, research, and writing of developmental psychologists until the early 1940s, when it was brought to the fore briefly in Neal Miller and John Dollard's landmark treatise, *Social Learning and Imitation* (1941).

Miller and Dollard identified two types of behavior that might properly be described as imitation. In one of these, *copying,* individuals learn from others by endeavoring simply to reproduce their behavior faith-

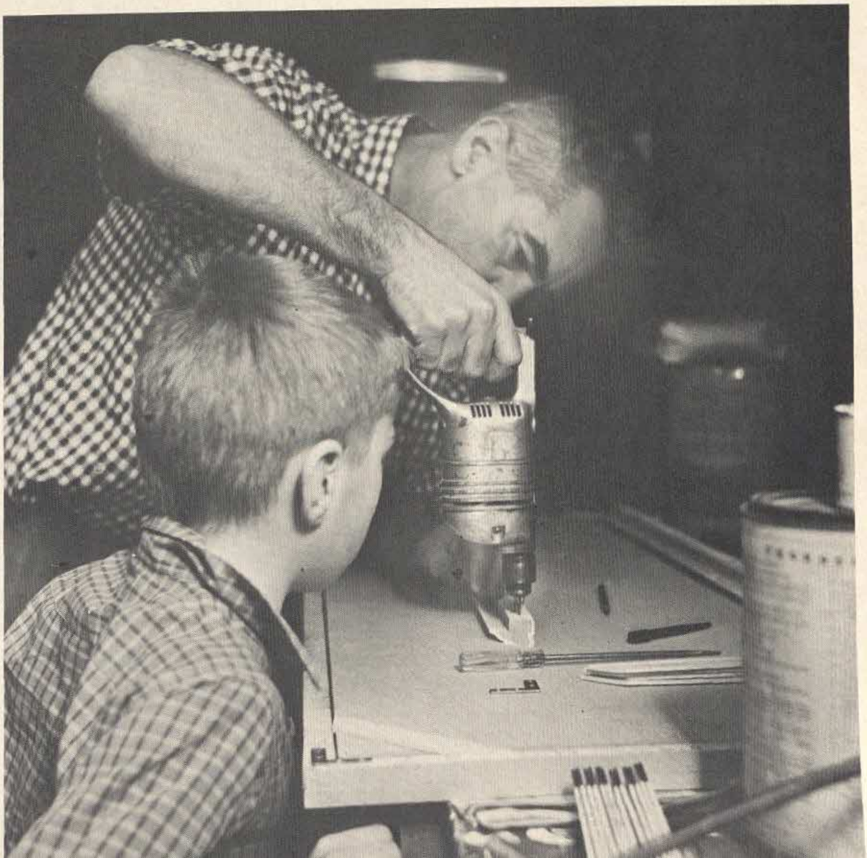


FIGURE 6–7
Children learn both specific skills and more general role behaviors through observing adults. Photo by Nancy Hays, Monkmeyer Press Photo Service.

fully and accurately. For copying to be successful, the copiers must know (or be told) whether their responses are acceptable reproductions. The second type of imitative phenomena of interest to Miller and Dollard was *matched-dependent* behavior, a type of behavior that can be understood in terms of the leader-follower relationship. In the matched-dependent situation it is assumed that the leader or model is able to read certain critical cues in the environment which the follower cannot detect. The follower is therefore dependent upon the leader's behavior as a cue to guide his or her actions. In this situation it is further assumed that the follower begins to imitate the behavior of the leader in order to gain the rewards that the leader has obtained.

Miller and Dollard argued the importance of imitation in everyday life, saying that "the young, the stupid, the subordinate, and the unskilled must depend on the older, the brighter, the superordinate, and the skilled . . ." (1941, p. 97). Furthermore, they assumed that imitativeness, like the desire for money, prestige, and the companionship of others, must be acquired as a joint function of the operation of instrumental learning and the presence of social conditions that foster its development and maintenance. They noted that "if matching or doing the same as others do, is regularly rewarded, a secondary tendency to match may be developed . . ." (1941, p. 10). Many years later Donald Baer, James Sherman, and their associates continued to investigate how imitativeness is learned, focusing on the generalized tendency to imitate others.

GENERALIZED IMITATION

In their first experiment, Baer and Sherman (1964) exposed children to an animated, talking puppet which was dressed as a cowboy and seated on a little chair appearing on a puppet stage. The puppet maintained conversation with the children and also engaged in other responses of interest to the investigators: nodding its head, opening and closing its mouth, and pressing a bar located beside its miniature chair. Observation of the children determined that generalized imitation—the tendency to imitate everything the puppet did—did not characterize the children's behavior initially.

The next step in the experiment was to directly reinforce the imitation of all of the puppet's responses *except bar-pressing*. When the pattern of imitation was well established, the puppet resumed bar-pressing, along with nodding, mouthing, and verbalizing. Imitation of the latter responses was continuous, *but no reinforcement was ever given for imitation of bar-pressing.*

The children's pressing a bar alongside of them was the basic dependent variable of the study. If bar-pressing by the child now increased, it could be attributed only to the reinforcement of other imitations and, inasmuch as bar-pressing is a very different act from the rewarded responses, an increase in bar-pressing would show that similarity or imitation per se had become important.

Did such generalized imitation occur? In seven of the eleven children in this experiment it did. Moreover, it was shown, with two of these children, that nonreinforced bar-pressing decreased when reward for imitating the other responses was terminated and increased again when reinforcement for imitating the other responses was reinstated. These findings, based on a shrewd modification of the usual *ABA* design (see Chapter 2), demonstrate the development of a true generalized imitation based on reinforcement.

The procedures devised by Baer and Sherman are potentially useful for more than theoretical purposes. The method appears to be appropriate for teaching those few children who fail to learn to imitate in the normal course of socialization to do so through experimental training procedures. In turn, laboratory-induced generalized imitation may form a basis for the learning of new and important skills, such as language.

In a pioneering study within this framework, Baer, Peterson, and Sherman (1967) employed these procedures in order to produce generalized imitation in three severely and profoundly retarded children between nine and twelve years of age. Although these children were toilet-trained and could feed themselves at the outset of the study, none used any language (except for occasional grunts) and all were practically without imitation. After initial imitation training, a relatively short period (approximately twenty hours) was sufficient to produce meaningful verbalizations such as the subject's own name, "Hi," "Okay," and so on. Modifications of such procedures have also been used in more extensive programs for severely disturbed and autistic children, particularly by Lovaas (1968), whose work will be discussed in a later chapter.

SOCIAL LEARNING AND MODELING

So far in this discussion the emphasis has been placed on the manner in which imitation as a *mode of responding* is acquired and maintained. In the remainder of this section we will consider observational learning within the framework of social learning, including the kinds of behaviors that can be learned and the complex subprocesses that are involved. The investigator most widely recognized in this area is Albert Bandura, who, along with a host of associates, has given us innumerable studies showing that children learn about many behaviors—aggression, sharing, social interaction, delay of gratification, cooperation—by watching others perform them. Bandura also has provided valuable analyses of observational learning as a basic process.

In one well-known experiment dealing with aggression, Bandura (1965) presented a view of observational learning in which the learning or *acquisition* of the modeled acts is distinguished from the *performance* of the modeled acts. The study also demonstrated the importance of *vicarious consequences*—i.e., outcomes that the observer sees accrue to the model for the behavior. When these outcomes are positive, they are called vicarious reward; negative outcomes are called vicarious punishment. In Bandura's experiment, modeling and vicarious consequences were provided by showing nursery school children a remarkable five-minute film on the screen of a television console:

> The film began with a scene in which a model walked up to an adult-size plastic Bobo doll and ordered him to clear the way. After glaring for a moment at the noncompliant antagonist the model exhibited four novel aggressive responses each accompanied by a distinctive verbalization.
>
> First, the model laid the Bobo doll on its side, sat on it, and punched it in the nose while remarking, "Pow, right in the nose, boom, boom." The model then raised the doll and pommeled it on the head with a mallet. Each response was accompanied by the verbalization, "Sockeroo . . . stay down." Following the mallet aggression, the model kicked the doll about the room, and these responses were interspersed with the comment, "Fly away." Finally, the model threw rubber balls at the Bobo doll, each strike punctuated with "Bang." This sequence of physically and verbally aggressive behavior was repeated twice. (Bandura, 1965, pp. 590–591)

As we have mentioned, the independent variable manipulated in this study involved the consequences the model received. One group of children saw, in addition to the film segment described above, a final scene in which the model was rewarded generously for assaults upon the clown. Specifically:

> For children in the model-rewarded condition, a second adult appeared with an abundant supply of candies and soft drinks. He informed the model that he was a "strong champion" and that his superb aggressive performance clearly deserved a generous treat. He then poured him a large glass of 7-Up, and readily supplied additional energy-building nourishment including chocolate bars, Cracker Jack popcorn, and an assortment of candies. While the model was rapidly consuming the delectable treats, his admirer symbolically reinstated the modeled aggressive responses and engaged in considerable positive social reinforcement. (P. 591, italics added)

A second group of children watched the film end with a final scene in which the model received punishment for his aggressive behavior. For children in this group:

> . . . the reinforcing agent appeared on the scene shaking his finger menacingly and commenting reprovingly, "Hey there, you big bully. You quit picking on that clown. I won't tolerate it." As the model drew back he tripped and fell, the other adult sat on the model and spanked him with a rolled-up magazine while reminding him of his aggressive behavior. As the model ran off cowering, the agent forewarned him, "If I catch you doing that again, you big bully, I'll give you a hard spanking. You quit acting that way." (P. 591)

A final group that served as a control group also saw the film, but without any final scene.

Thereafter, all children were brought individually into an experimental room which contained a plastic Bobo doll, three balls, a mallet, a pegboard, plastic farm animals, and a dollhouse which was equipped with furniture and a miniature doll family. This wide array of toys was provided so that the child would be able to engage either in imitative aggressive responses—i.e., the model's responses—or in alternative nonaggressive and nonimitative forms of behavior. Each child was left alone with this assortment of toys for ten minutes while his or her behavior was periodically recorded by judges who watched from behind a one-way vision screen. The frequency of imitative aggressive behavior in this situation constituted the performance measure of the study. Not surprisingly, it was found that children who saw the model punished for aggressive actions exhibited far fewer imitative aggressive responses than did those in either of the other two groups. But—and this is the major point of Bandura's analysis—it would be inappropriate to conclude that because the children in this group did not spontaneously imitate, they had learned nothing.

To demonstrate that learning had occurred in all groups, irrespective of whether it was spontaneously revealed in performance, the experimenter reentered the room well supplied with incentives (colored sticker pictures, sweet fruit juices in an attractive dispenser, and so on) and told the child that, for each act of imitative aggression that he or she could reproduce, an additional juice treat and sticker would be given. The youngster's ability to reproduce the model's behavior in this situation (i.e., when asked to display what he or she had learned) constituted the acquisition measure. The results provided direct support for distinguishing between two separate aspects of imitative learning, acquisition and performance. As expected, when incentives were specifically offered for demonstrating acquisition of the model's acts, the effects of punishment were wiped out, with all groups showing the same very high level of learning.

This work, as well as a number of successful replications which have followed—e.g., Liebert and Fernandez (1970), Liebert, Sobol, and Copemann (1972)—has practical implications. Consider, for example, popular entertainment that displays to children the intricate details and planning required for the execution of remarkable acts of larceny or homicide. Widespread showing of such "adventures" is often justified by the fact that the perpetrators of such felonious acts are inevitably punished. However, even though witnessing punished crimes may be unlikely to lead to spontaneous imitation, Bandura's work shows that punishment does not impede learning of them; later they may be reproduced in "real life," should the environmental contingencies ever unambiguously favor their occurrence.

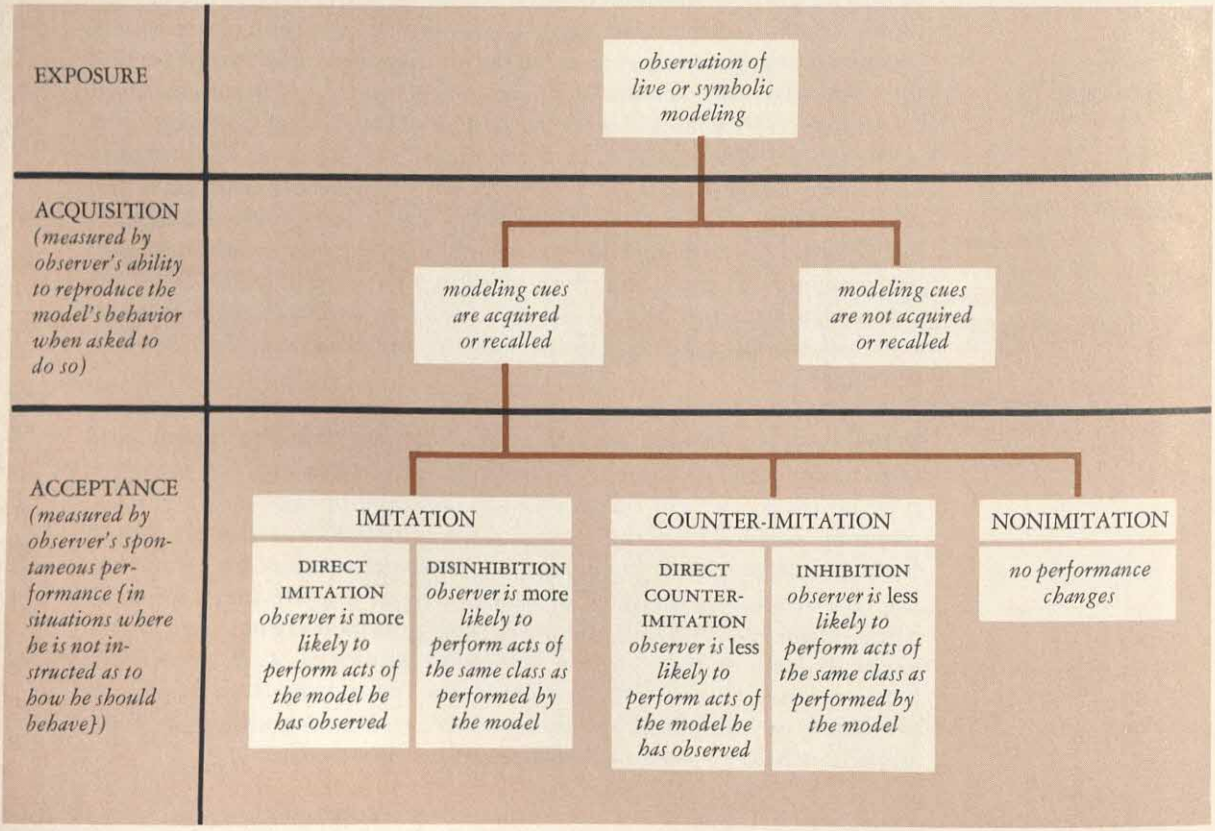
THE FORMS AND SEQUENCE OF OBSERVATIONAL LEARNING

Just as classical conditioning and instrumental learning show generalization (i.e., they extend beyond the situation in which learning originally occurred), observational learning involves more than the recall and exact reproduction of a model's responses. To understand these additional processes, we must distinguish between direct imitative effects and inhibition-disinhibition.

Direct imitative effects We have seen that exposure to a model can lead to relatively exact copying of the exemplary behavior, either immediately or when the environmental conditions are made conducive; this is *direct imitation.* Observing another's behavior also can *reduce* the probability of matching. The child who sees a peer burned by a hot stove, for example, typically will become *less* likely to touch the dangerous appliance than previously: the exemplar's actions and its consequences are accepted as a guide for what should not be done. Such an outcome may be thought of as *direct counter-imitation.*

Inhibitory and disinhibitory effects Observational learning may also apply to actions that fall into the same general class as those observed,

FIGURE 6-8
The three stages of observational learning.


EXPOSURE
observation of live or symbolic modeling
ACQUISITION (measured by observer's ability to reproduce the model's behavior when asked to do so)
modeling cues are acquired or recalled
modeling cues are not acquired or recalled
ACCEPTANCE (measured by observer's spontaneous performance (in situations where he is not instructed as to how he should behave))
IMITATION
DIRECT IMITATION observer is more likely to perform acts of the model he has observed
DISINHIBITION observer is more likely to perform acts of the same class as performed by the model
COUNTER-IMITATION
DIRECT COUNTER-IMITATION observer is less likely to perform acts of the model he has observed
INHIBITION observer is less likely to perform acts of the same class as performed by the model
NONIMITATION
no performance changes

but which are different in virtually all particulars. Youngsters who observe a movie filled with shooting and brawling, for example, may become more likely to yell at or push a younger sibling than if they had not seen exemplary hostilities. In such a case we note that aggressive responses in general have increased or been *disinhibited*. Similarly, a child who, on the first day of class, sees that the new teacher punishes a classmate for disrupting the lesson may subsequently be less likely to turn in homework assignments late. Failing to turn in homework and speaking out inappropriately in class, though far from identical, fall into a common category of behavior—disobedience to the dictates of the teacher—and thus the second child's general *inhibition* regarding breaking the rules may be traced to the first child's disruption of the class and the vicarious punishment that followed.

As outlined above, observational learning is a complex process that involves three steps: *exposure* to the responses of others, *acquisition* of what one has seen, and subsequent *acceptance* of the modeled acts as a guide for one's own behavior (Liebert, 1972; Liebert and Poulos, 1975). This sequence is presented in Figure 6–8.

In explaining observational learning, Bandura (1971, 1973) and others have argued that reinforcement alone cannot account for this complex sequence. Nor can explanations that observational learning occurs because the imitated behaviors had previously been classically conditioned to similar social situations. Individuals do not imitate all behaviors in all social situations, even though relevant conditioning may have occurred in the past. Rather, it appears that an explanation of observational learning must include consideration of several subprocesses that underlie exposure, acquisition, and acceptance. In Selection 3 Bandura sets forth some of these requisite subprocesses.

SELECTION 3

LEARNING THROUGH MODELING

Albert Bandura

One of the fundamental means by which new behaviors are acquired and existing patterns are modified entails modeling and vicarious processes. It is evident from informal observation that human behavior is to a large extent socially transmitted, either deliberately or inadvertently, through the behavioral examples provided by influential models. Indeed, as Reichard (1938) noted some years ago, in many languages, "the word for 'teach' is the same as the word for 'show.'"

There are several reasons why modeling influences play a paramount role in learning in everyday life. When mistakes are costly or dangerous, skillful performances can be established

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Adapted and reprinted from A. Bandura, *Aggression: A Social Learning Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, 1973), pp. 68–72.

without needless errors by providing competent models who demonstrate how the required activities should be performed. If learning proceeded solely through direct experience, most people would never survive their formative years because mistakes often result in fatal consequences. Some complex behaviors, of course, can be produced only through the influence of models. If children had no opportunity to hear speech, for example, it would be virtually impossible to teach them the linguistic skills that constitute a language. Where certain forms of behavior can be conveyed only by social cues, modeling is an indispensable aspect of learning. Even in instances in which it is possible to establish new skills through other means, the process of acquisition can be considerably shortened by providing appropriate models (Bandura and McDonald, 1963; Luchins and Luchins, 1961).

. . .

CONCEPTUALIZATION OF OBSERVATIONAL LEARNING

Learning by example depends upon four interrelated subprocesses. . . . the four subsystems governing observational learning will be reviewed briefly because they specify the conditions that must obtain if the examples set by others are to have enduring behavioral effects.

ATTENTIONAL PROCESSES A person cannot learn much by observation if he does not attend to, or recognize, the important features of the model's behavior. One of the main component functions in observational learning therefore involves attentional processes. Exposure to models does not in itself ensure that people will attend closely to them, that they will necessarily select from models' numerous characteristics the most relevant ones, or that they will even perceive accurately the aspects they happen to notice.

Among the numerous factors that determine observational experiences, a person's associational preferences are undoubtedly of major importance. The people with whom a person regularly associates delimit the types of behavior that he will repeatedly observe and hence learn most thoroughly. . . .

Within any social group, certain members are more likely to be selected as sources of behavior than others. The functional value of the behaviors displayed by different models is highly influential in determining which models will be closely observed and which will be ignored. A model's efficacy is inferred partly from tangible evidence of the results his actions typically produce and partly from status-conferring symbols that signify competence and past successes. The behavior of models who possess high status in prestige, power, and competence hierarchies is more likely to be successful and therefore to command greater attention from others than the behavior of models who are socially, occupationally, and intellectually inept.

Attention to models is channeled not only by the utilitarian value of their behavior, but also by their interpersonal attraction. Models who possess interesting and winsome qualities are actively sought, whereas those who lack rewarding characteristics tend to be ignored or actively rejected, even though they may excel in other ways. Control of attention through rewarding qualities is perhaps nowhere better illustrated than in televised modeling. Most televised stimulation commands the attention of people of all ages for extended periods. Indeed, models presented in televised form are so effective in holding attention that viewers learn the depicted behavior regardless of whether or not they are given extra incentives to do so (Bandura, Grusec, and Menlove, 1966). Psychological characteristics of viewers also exert selective influence on what they are most likely to attend to.

Observational learning is not a passive receptive process in which people simply absorb the vast array of models they encounter in their daily interactions. When people are exposed to a variety of models, as is invariably the case, they rarely confine their learning to a single source, nor do they reproduce all the characteristics even of preferred models. In experiments in which multiple models display different behaviors, the imitative patterns of observers generally represent amalgams of elements from the different models (Bandura, Ross, and Ross, 1963). Moreover, the particular admixture of behavioral attributes varies from person to person. Conflicting modeling influences arising from adult and peer sources are likewise more apt to produce composite patterns than exclusively adult or peer identifiers (Bandura, Grusec, and Menlove, 1966).

Traditional theories of personality generally depict identification as a pervasive outcome that is firmly established early in the child's life in relation to parental figures and that then predetermines the direction of later development. Research findings reveal that modeling influences are considerably more complicated. Modeling is a continuous process in which new behaviors are acquired and existing patterns to some extent modified by exposure to influences from diverse actual and symbolic models at all periods of life (Bandura, 1969).

RETENTION PROCESSES A person cannot be much influenced by the behavior of a model if he has no memory of it. Another requisite function involved in observational learning, therefore, concerns long-term retention of activities that have been modeled at one time or another. In order to reproduce social behavior when the model is no longer present to serve as a guide, the response patterns must be represented in memory in symbolic form. Past events can achieve some permanence by being represented in images or in descriptive verbal symbols for future use. After modeled behaviors have been so transformed, these memory codes function as internal guides for imitative actions. Observers who preserve modeled activities in words and vivid imagery learn and retain the behavior better than those who passively observe or are mentally preoccupied with other matters while watching the performances of others (Bandura, Grusec, and Menlove, 1966; Bandura and Jeffery, 1973; Gerst, 1971).

In addition to symbolic coding, rehearsal also serves as an important memory aid. People who mentally rehearse or enact modeled patterns of behavior are much less likely to forget them than those who neither think about nor practice what they have seen. Most violent forms of behavior cannot be overtly practiced because of social prohibitions. It is therefore of considerable import that mental rehearsal, which can be readily engaged in when behavioral enactment is either impeded or impracticable, may increase retention of modeled behavior.

MOTOR REPRODUCTION PROCESSES The third component of modeling is concerned with behavioral enactment of what one has learned. To achieve behavioral reproduction, a learner must put together a given set of responses according to the modeled patterns. The amount of observational learning that a person can exhibit behaviorally depends on whether or not he has the required component skills. If he has the subskills, modeled behavior can be more faithfully enacted than if they are lacking. In the latter instance, the symbolic learning remains in abeyance until prerequisite skills are developed through further observation or practice.

Even though symbolic representations of modeled activities are developed and retained, behavioral enactment may be impeded because individuals do not have the physical capabilities with which to carry out the necessary activities. A young child can learn observationally the behavior for driving an automobile and be adept at executing the component responses, but if he is too short to operate the controls, he will be unable to coordinate the action sequences needed to maneuver a vehicle successfully.

REINFORCEMENT AND MOTIVATIONAL PROCESSES A person can acquire, retain, and possess the capabilities for skillful execution of modeled behavior, but the learning may rarely be activated into overt performance if it is negatively sanctioned or otherwise unfavorably received. When positive incentives are introduced, observational learning that previously remained unexpressed is likely to emerge in action. Reinforcement influences not only regulate the overt expression of matching behavior, but also affect observational learning by determining the amount of attention people will pay to various models they encounter in their everyday life. Moreover, incentives aid selective retention of what has been learned by motivating observers to code and to rehearse modeled responses that have high functional value for them.

For reasons given above, exposure to models, even prestigious ones, does not automatically produce matching performances. In any given instance absence of imitative behavior may result from faulty observation, retention losses due to inadequate symbolic representation and rehearsal, motor deficiencies, or simply unwillingness to perform the exemplified behavior because of its unfavorable consequences.

Bandura's conceptualization of observational learning is actually very different from that posited by traditional learning theorists who sought to explain learning (both classical and instrumental) in terms of the association of stimuli and responses. Strict S–R theorists view the child as a more or less passive responder, whereas Bandura emphasizes cognitive processes, those that are considered in the realm of complex thinking—attention, memory, and problem solving—which are at least partially instigated by the child. Chapter 7 is devoted to cognitive theorists, but it is noteworthy that many learning theorists themselves have moved from the strict S–R model of behavior by postulating a mediating event between the stimulus and the response. The remaining portion of this chapter discusses complex processes in learning and sets the stage for Chapter 7.

COMPLEX PROCESSES IN LEARNING

LEARNING TO LEARN

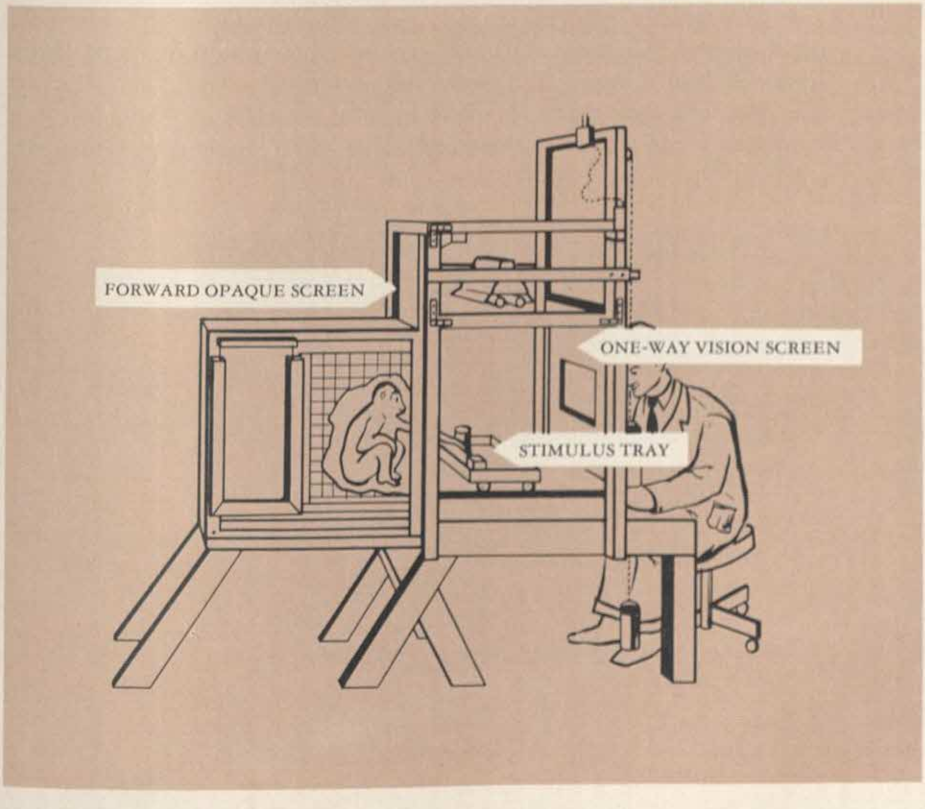
Finding the solution required by a new problem situation is one important kind of complex learning. Historically, two types of approaches to problem solving have been recognized: trial and error, and insight. Trial and error, as we have already seen, was first experimentally studied by Thorndike, who placed his subjects (chicks, dogs, and cats) into a box from which they could escape to obtain food only by performing a specific response. According to his observations, reasoning was not involved. But the trying out of behaviors, more or less randomly, or the accidental stumbling on correct solutions is not typical for humans, although it may be found in the very inexperienced. Most instances of trial and error involve some selection of particular acts which have been successful in the past (Berlyne, 1970).

Long ago, Wolfgang Köhler suggested that organisms come to solve problems by discovering relations or principles inherent in the situation. Such apparently insightful behavior was demonstrated in Köhler's studies of apes who were given food placed just beyond their reach. At some point the animals suddenly appeared to realize the solution—using a stick to pull the food toward them. Insight involved, then, an internal restructuring of the situation in terms of the relations of its aspects to each other.

As it turns out, trial and error and insight are not as distinguishable as they once appeared. Insight can be interpreted as the result of previous experiences in somewhat different situations. One psychologist who has taken such a tack is Harry F. Harlow.

Harlow's work began with simple discrimination problems, employing both young children and monkeys (Harlow and Harlow, 1949). For example, in the simplest experiment, monkeys were shown two objects that had been placed on a board. The objects always had some distinctive dimension, such as color—one being black and the other white as

FIGURE 6-9
The Wisconsin General Test Apparatus used by Harlow for discrimination-learning tasks. Adapted from Harlow, 1949.

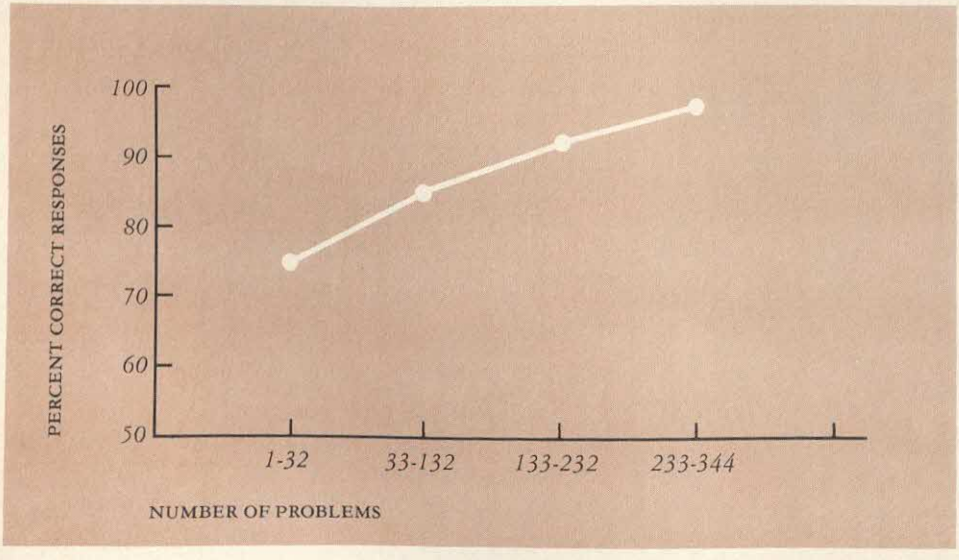


the specific attributes. The experimenter predetermined the "correct" attribute, and if the animal touched the object that possessed it, a reward—a peanut or a raisin—was found underneath. The test apparatus (Figure 6–9) allowed for the consecutive presentation of different pairs of black versus white objects that varied unsystematically on other dimensions (e.g., form, object position). The number of pairs that had to be presented before the monkey consistently chose the object of each pair that had the correct attribute was the measure of learning.

Initially, the monkeys learned the correct response by a "fumble and find" process that required them to view many pairs of objects. The problem could always be solved in two trials, though. If black was the correct attribute and black was chosen and rewarded on Trial 1, the animal could "stay" with the choice black from then on. If, on the other hand, white was correct and the animal first chose black and received no reward, it could shift to white on Trial 2, receive a reward, and then "stay" with white on all subsequent trials. However, this rapid solving by a "win-stay, lose-shift" strategy is possible only if the animal has "insight" into the solution. Harlow found that with experience the monkeys did indeed gain such insight (Harlow, 1949). As indicated in Figure 6–10, the greater the number of problems presented, the more rapidly the monkeys solved them.

Research with children showed essentially the same phenomenon, although learning occurred more rapidly. The youngsters made many errors at the beginning, usually of the same type as those made by the monkeys, but they gradually came to solve the class of problems—for example, by always picking the red object—in a single trial. This pro-

FIGURE 6–10
Percentage of correct responses occurring rapidly (on Trials 2–6) according to the number of discrimination problems presented to monkeys. The more experience the animals had in solving the problems, the more rapidly they solved them. Adapted from Harlow, 1949.



gressive learning about common features of problems has been called "learning to learn."

Further evidence that a true organizational habit has been established comes from research in which the relevant attribute is suddenly reversed; that is, the previously incorrect object is now rewarded, while the one that had been correct no longer leads to reward. Such switchovers, called *reversal shifts,* lead to many errors initially, but after extensive experience, learning occurs. We see, after training, perfect performance immediately following the first reversal trial, which is retained for long periods of time. When problems that took weeks to master are reintroduced after a whole year without practice, monkeys will return to top efficiency after a few hours of practice—and sometimes after only a few minutes.

What are the implications of these findings? Harlow and Harlow (1949) have put it this way:

> Suppose we picture mental activity as a continuous structure built up, step by step, by the solution of increasingly difficult problems, from the simplest problem in learning to the most complex one in thinking. At each level the individual tries out various responses to solve each given task. At the lowest level he selects from unlearned responses or previously learned habits. As his experience increases, habits that do not help in the solution drop out and useful habits become established. After solving many problems of a certain kind, he develops organized patterns of responses that meet the demands of this type of situation. These patterns, or learning sets, can also be applied to the solution of still more complex problems. Eventually the individual may organize simple sets into more complex patterns or learning sets, which in turn are available for transfer as units to new situations. . . . At the highest level in this progression, the intelligent human adult selects from innumerable, previously acquired learning sets the raw material for thinking. His many years of education in school and outside have been devoted to building up these complex learning sets, and he comes to manipulate them with such ease that he and his observers may lose sight of their origin and development. [P. 5]

Although it is apparent that learning sets are acquired and used, even by young children, we must still ask what psychological processes underlie or facilitate their formation. One answer lies in mediation.

MEDIATION AND DISCRIMINATION

A *mediator* is some internal event intervening between a stimulus and an overt response. The initial stimulus results in a mediator that, in turn, acts as a stimulus for the final response. Thus the sequence $S–M_s–R$ represents the behavior rather than the sequence S–R. It is possible, too, that several mediators may be linked together before the final response is made.

Tracy and Howard Kendler have focused on the role of *verbal mediation* in learning, postulating that the intervening response involves the

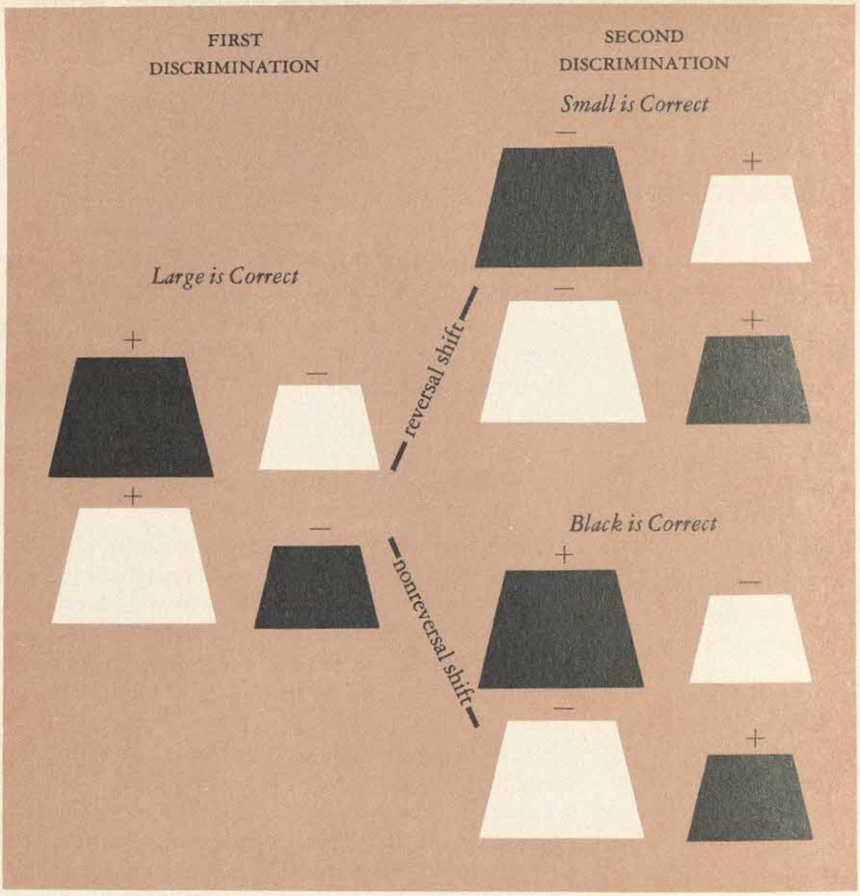
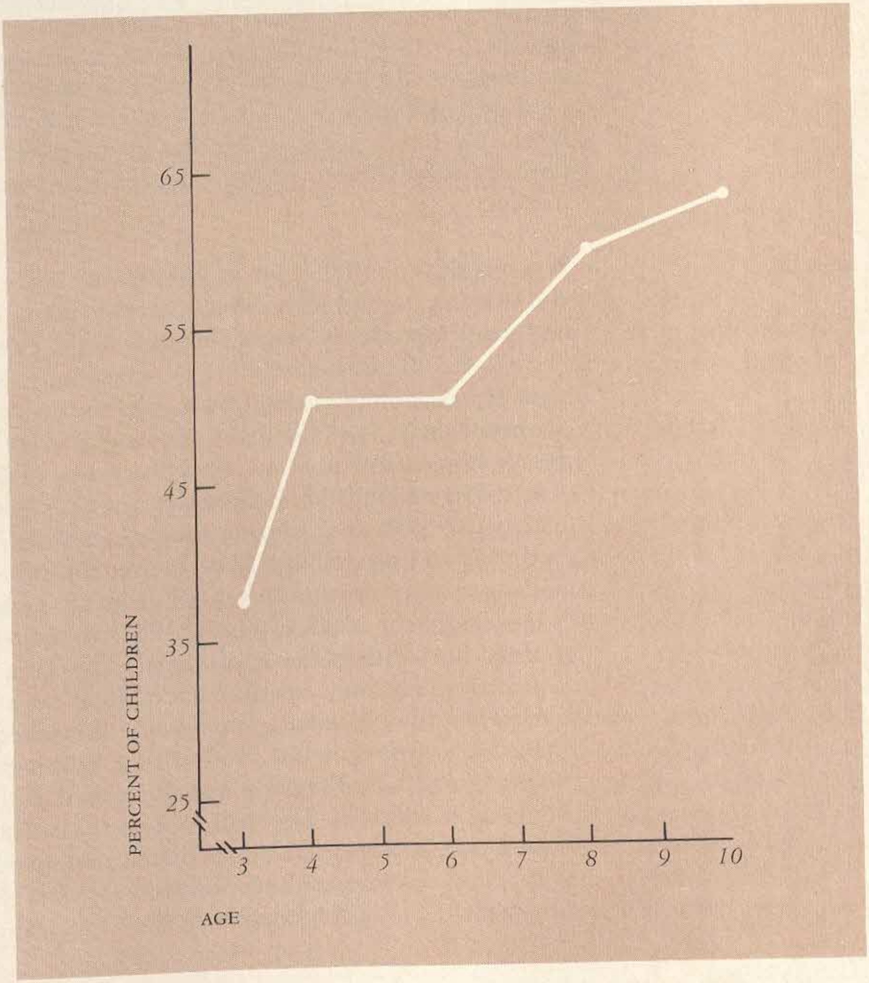


FIGURE 6–11
Examples of a reversal and a nonreversal shift, where (+) indicates the rewarded and (–) the nonrewarded stimuli. Adapted from H. H. Kendler and T. S. Kendler, Vertical and horizontal processes in problem-solving. *Psychological Review,* 1962, **69**, 1–16. Copyright 1962 by the American Psychological Association. Reproduced by permission.

use of covert language (Kendler and Kendler, 1962; Kendler, 1963, 1974). To demonstrate the utility of this approach, the Kendlers tested children in a discrimination-learning task. First, pairs of stimuli which differed on two dimensions were presented. Rewarded each time that they responded to one attribute of one of the dimensions, children learned the solution to the problem. For example, a child was shown two cups. One was black and the other white (color dimension); one—sometimes the black cup, sometimes the white—was large and the other small (size dimension). Each time the large cup was selected, regardless of whether it was black or white, a reward was received; selecting the small cup never led to reward during training. Thus the child learned that size was the relevant dimension, with large the correct attribute. Color was irrelevant, for both black and white cups had been rewarded about half the time. Some subjects were then shifted to attribute *reversals:* size remained relevant, but they now had to pick the small cup rather than the large one in order to be correct. Other subjects were shifted to *nonreversals*—i.e., the relevant dimension changed to color so that the black cup, for example, had to be chosen regardless of whether it was small or large. (See Figure 6–11).

A simple learning analysis (S–R) would assume that nonreversal shifts would be the easier task; the newly correct response (selecting black) had previously been rewarded each time the large cup happened to be black. In reversal shifts, the newly correct response (selecting small)

FIGURE 6–12
Percentage of children of different ages responding in a mediational manner. Adapted from H. H. Kendler and T. S. Kendler, Vertical and horizontal processes in problem-solving. *Psychological Review*, 1962, **69**, 1–16. Copyright 1962 by the American Psychological Association. Reproduced by permission.



had never been rewarded previously. Because it should be easier to strengthen a response that has already been rewarded, nonreversals should be learned more easily than reversals. On the other hand, the mediational hypothesis predicts the opposite outcome—that reversals are more easily learned. The mediator in reversals must shift only within a dimension (from large to small), not across a dimension (from large to black) as in nonreversals.

Kendler and Kendler found support for this conceptualization: human adults accomplished a reversal shift more rapidly than a nonreversal shift, whereas rats found a nonreversal shift easier. These findings posed the interesting problem of locating the transition point from simple stimulus-response associated to mediation. The Kendlers worked with children in order to further investigate mediational processes. In an experiment that typifies their results (Kendler, Kendler, and Learnard, 1962), children from three to ten years of age showed a progressive change in their problem solving that indicated that 50 percent of those between four and six years of age were employing mediation (see Figure 6–12). It has also been shown that when children are instructed to use mediators during discrimination shift problems, the younger ones perform more like the older children. Being instructed to label apparently helps nonmediators adopt a mediational mode. Similar results have been demonstrated in a very different process—that of memory.

MEMORY

When children of different age groups are presented with a list of items and are later asked to recall the items in some way, their performance becomes increasingly better with age (Cole, Frankel, and Sharp, 1971; Flavell, 1970b; Hagen, 1971). To what can this progression be attributed? By observing youngsters during the task or by arranging the task in certain ways, several investigators have been able to examine the mediating process involved in memory. Depending upon the particular task, different kinds of mediators might be employed: language, images (e.g., pictures in the head), or motor behaviors such as gestures. In any event, spontaneous rehearsal before recall of the list indicates the use of mediators and can therefore provide a clue to memory.

Flavell, Beach, and Chinsky (1966) tested kindergartners, second-graders, and fifth-graders, placing before each child pictures of well-known objects. The experimenter pointed to a subset of the pictures, rearranged the pictures, and then asked the child to identify the subset. The child's lips were observed to determine whether verbal rehearsal occurred, and later the child was questioned about the method he or she used in remembering the subset of pictures. Based on lip reading, rehearsal clearly was age related—that is, it increased with age (see Figure 6–13). The results were even more strongly in this direction when they included the children's reports of their own rehearsal behavior.

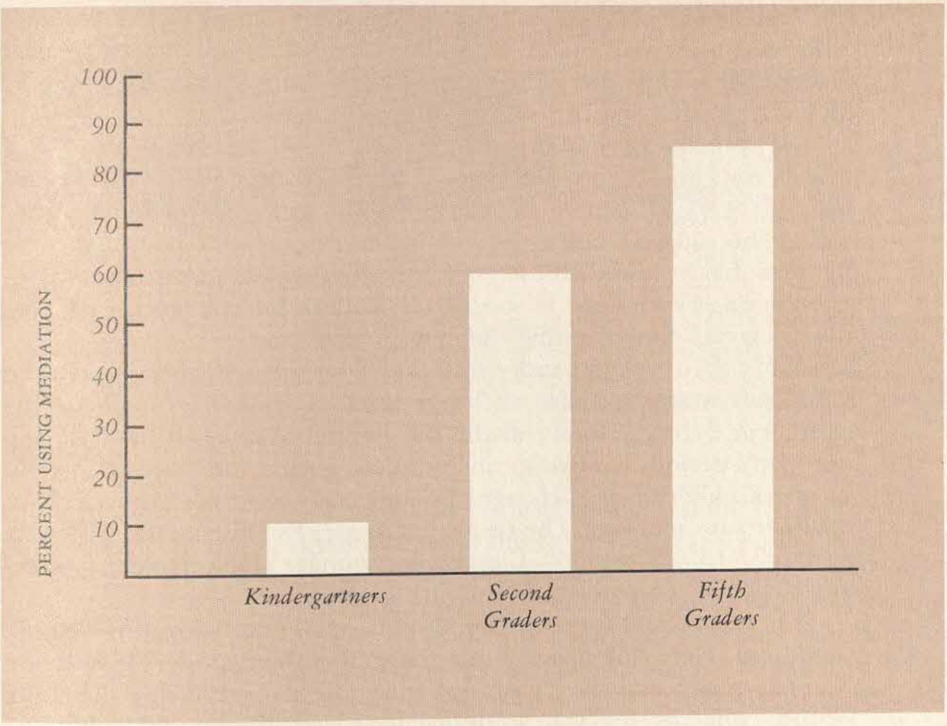


FIGURE 6–13
Percentage of children of different ages using verbal mediation during a memory task. From Flavell, Beach, and Chinsky, 1966.

The reason for this finding was in doubt, however. On the one hand, perhaps young children simply did not rehearse (e.g., use a verbal mediator), even though they were capable of doing so. On the other hand, perhaps they were unable to produce the mediator at all. The former possible deficiency was labeled *mediational deficiency;* the latter, *production deficiency*. There is, in fact, evidence that production deficiency underlies memory difficulty in the very young because when verbal labels are provided by the experimenter, children are frequently able to use them, thereby facilitating their performance (Flavell, 1970b; Hagen and Kingsley, 1968). It is probably the case, then, that the young child is relatively lacking in the ability to organize the material in a way that is conducive to producing mediators.

One method of organization that is apparently effective for adults is the categorization or clustering of to-be-remembered items under one suitable label. Children, too, employ such a method, but age differences are evident (e.g., Kobasigawa, 1974). As an example, we can examine a study in which the recall items were twenty-four pictures of common objects that could be clustered into four categories: vehicles, furniture, clothing, and animals (Moely, Olson, Halwes, and Flavell, 1969). The pictures were placed on a table, the child named each picture, and he or she was then given two minutes to study for the memorization test. The child also was informed that it was permissible to move the pictures around. All fifth-graders and some of the kindergartners, first-graders, and third-graders participated in this control group.

The remaining kindergartners, first-, and third-graders, were placed into one of two training groups. For children in the *Naming* group, the experimenter embellished the original instructions by providing the category labels (e.g., things to ride in) and pointing to the pictures that fit into each category. For the *Teaching* group, the experimenter aided each child in sorting the pictures into categories, labeling the categories, and counting the items in each one.

In addition to the memory test, the experimenters also obtained an independent measure, for each age level, of ability to categorize the items. For each age level control, the amount of categorization during the study period, relative to ability to categorize, indicated the extent to which children of each age spontaneously used category labels as mediators for memory. The results for grades K, 1, 3, and 5 respectively were .07, .16, .19, and .60. Clearly, the younger children were production deficient compared with the fifth-graders.

Two other findings were important, one concerning the training conditions. Here, the investigators found that third-graders in both the Naming group and the Teaching group categorized during the study period, whereas for the kindergartners and first-graders only the stronger Teaching condition elicited mediation. Finally, there was no evidence for a mediational deficiency in the younger children; when the mediators were produced for them in training, they resulted in increases in memory.

While recognizing that developmental changes in memory entail specific skills in mediation, Flavell (1970b) suggests that they also include a more general process involving deliberate selection of a suitable mediator. For example, memorizing unusual designs with specific details might best be accomplished by imagery or some combination of imagery and labeling. "Homing in" on the most effective mediator is, according to Flavell, a type of problem solving, and we would, of course, expect increasing sophistication with age. In the following section, one quite recent area of research into children's problem solving—hypothesis testing—is discussed developmentally. For this, we turn back to the task of discrimination learning.

HYPOTHESIS TESTING

According to Marvin Levine (1974; Phillips and Levine, 1975), a major investigator in the area, when individuals are presented with a discrimination task, they begin with a hypothesis about what attribute is correct and they choose the object that displays the attribute that their initial hypothesis calls for. If they subsequently find out that they have chosen an incorrect attribute, they switch to another hypothesis. In this manner, by eliminating incorrect selections, people attempt to solve the problem in some systematic way.

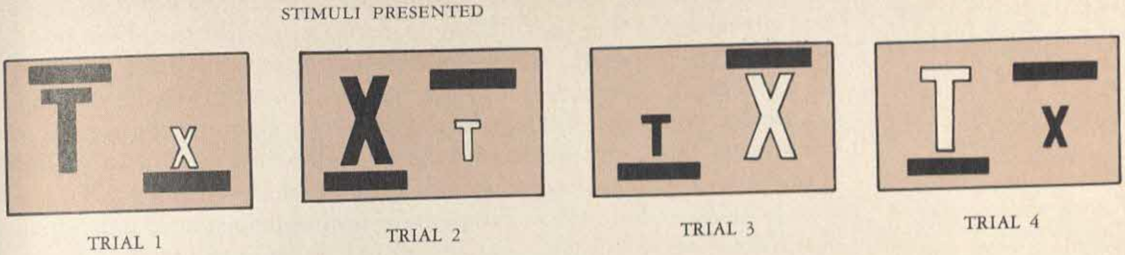


FIGURE 6–14
An example of the stimulus pairs presented in Levine's hypothesis-testing procedure. If the most efficient strategy, focusing, is used, the problem can be solved in four trials. To understand the problem, select any attribute as "correct," then begin with any hypothesis, give yourself appropriate "right" or "wrong" feedback, and see if you can reach the solution by Trial 4. From Levine, 1974.

Levine and his associates examined hypothesis testing by presenting stimuli in pairs, shown in Figure 6–14, that involved four dimensions, each with two attributes: letter (T or X), size (large or small), color (black or white), and bar (bar up or bar down). Within the procedure, the person views, to use Figure 6–14 as an example, the paired stimuli presented on Trial 1, selects one or the other of the pair based on the hypothesis held, and is told "right" or "wrong" by the experimenter. Then a new stimulus pair is presented on Trial 2, one of the pair is chosen, and so on.

It is obvious that being told "right" or "wrong" applies to more than one dimension. If the individual holds the hypothesis *bar up* on Trial 1, he or she will choose the left-hand stimulus. But the feedback "right" means that *T* or *large* or *black* or *bar up* or *left position* could be the solution. (If the right-hand stimulus was selected, the feedback "wrong"

TABLE 6–1
SOME POSSIBLE WAYS OF TRYING TO SOLVE COMPLEX DISCRIMINATION TASKS, IN DECREASING ORDER OF EFFICIENCY.

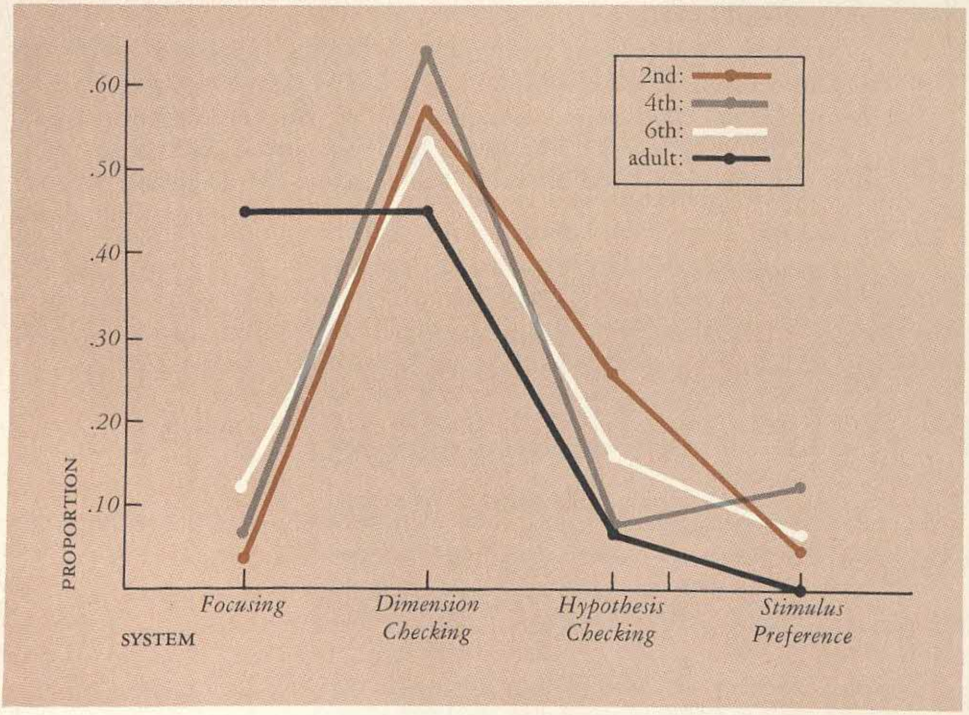
Focusing	Individual logically eliminates all disconfirmed attributes.
Dimension Checking	Individual systematically checks all four dimensions, one dimension at a time.
Hypothesis Checking	Individual systematically checks all eight attributes, one at a time.
Stimulus Preference	Individual repeatedly selects one attribute even after being told it is incorrect.

Adapted from Levine, 1974.

provides the same information indirectly.) It is possible, though, to logically narrow down the solution over trials, and the most efficient way of doing this, focusing, requires only four responses. Other strategies are possible, but they are not as efficient or do not lead to the solution. Levine has devised a method whereby he can examine the record of the choices made and determine the hypothesis the person is holding at any one time, and the way in which the problem is being solved. It is thus possible to compare the hypothesis testing behavior of individuals of different ages.

In initial experiments, second-, fourth-, and sixth-graders and college students participated (Gholson, Levine, and Phillips, 1972). Figure 6–15 shows the frequency with which different age groups used four problem-solving strategies: focusing, dimension checking, hypothesis checking, and stimulus preference, in order of efficiency. (See Table 6–1, p. 159). The first three strategies can lead to the solution whereas stimulus preference does not (unless the one choice just happens to be correct). In fact, stimulus preference—choosing the same attribute repeatedly even after it has been identified as incorrect—is considered a primitive stereotyped behavior. Note, however, that all the children most frequently used the second most efficient strategy compared with the adults' using focusing and dimension checking equally as often.

FIGURE 6–15
The frequency with which different age groups used four methods to solve the problems. The methods are ordered from the most to the least efficient, with the latter being a stereotyped behavior. From Levine, 1974.



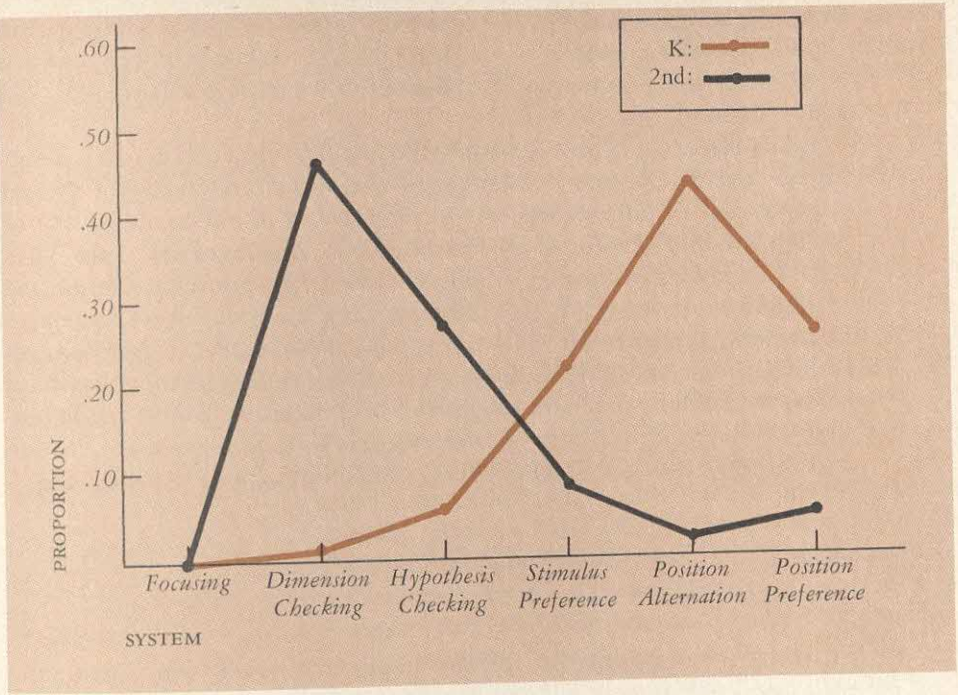


FIGURE 6–16
The frequency with which second-graders and kindergartners used different methods in attempting to solve the problems. The methods are ordered from the most to the least efficient, with the latter three methods being stereotyped behaviors. From Levine, 1974.

A later experiment, involving second-graders and kindergartners, demonstrated an even more interesting developmental difference. Here the results for second-graders were essentially the same, except that there was slightly more stimulus preference and a small amount of position alternation and position preference. The latter two strategies, like stimulus preference, are stereotyped behaviors. In position alternation, the individual alternates selecting the stimulus on the right, then the left; in position preference, either right or left is the consistent basis for selection. These stereotyped choices are striking in their failure to solve the problems and in their insensitivity to feedback. Nevertheless, kindergartners overwhelmingly employed them (see Figure 6–16).

In sum, 90 percent of the strategies of college students are of the two most efficient types, children between seven and eleven years of age tend to use task-appropriate methods of intermediate efficiency, and kindergartners function at a primitive and inefficient level. The pattern varies somewhat with task difficulty: given four dimension versus eight dimension problems, second-graders employ somewhat less efficient strategies with eight dimensions, whereas sixth-graders are unaffected (Gholson and Danziger, 1975). But the difference found between kindergartners and second-graders is fascinating because it is consistent with a general finding of dramatic change that occurs somewhere between the ages of five and seven years. We have already noted that, according to the Kendlers, children switch, for the most part, to a mediational framework by this time. The same has been found for memory mediation, as well as for a variety of other tasks.

Many researchers have attempted to explain this pattern, often pointing to the development of language and the commencing of formal education as of possible importance. According to one analysis, that of Sheldon White (1965), early learning, that which occurs before five years of age or so, is fundamentally associative. Responses are connected to stimuli more or less directly, and learning is rapid. Between the ages of five and seven, White contends, a new mode emerges that involves coding stimuli and linking them together, even though they may have been separated by time and situation. This "cognitive" mode, made possible primarily by verbal mediation, can act to inhibit associative action and is itself reflective. In short, it is complex information processing.

SUMMARY

Learning is responsible for many changes that result from encounters with the environment. Three basic methods of learning are widely recognized: classical conditioning, instrumental learning, and observational learning.

Pavlov first systematically investigated classical conditioning, whereby a response (CR) comes to be elicited by a previously neutral stimulus (CS) after the stimulus has been paired with the unconditioned stimulus (UCS). Pavlov also noted that generalization, discrimination, and extinction occur in classical conditioning. In generalization, stimuli similar to the CS elicit the conditioned response without any additional conditioning trials. Discrimination involves the individual's responding to stimuli that had been paired with the UCS, but not to stimuli that had not been so paired. Extinction of a CR occurs when the CS is presented without the UCS many times. We know today that from infancy on children learn many attitudes and much behavior through classical conditioning, including negative and positive evaluations, fears, and prejudices. Watson provided clear examples of the phenomenon in children, the most famous being the case in which "little Albert" was conditioned to fear a rat. Mary Cover Jones also demonstrated years ago that fear can be counter-conditioned.

Instrumental learning is based on Thorndike's original law of effect, which states that the consequences of an act determine the probability of its future occurrence. Positive and negative reinforcement increase the probability, whereas punishment decreases it. Reduction of a biological need is primary reinforcement, but events associated with need reduction become secondarily reinforcing in themselves. In this way each of us comes to respond to a range of reinforcers. As in classical conditioning, extinction, generalization, and discrimination are relevant to instrumental learning. Extinction occurs when a response that once led to reinforcement no longer does so. Generalization of the learned response occurs when individuals exhibit the act in situations that are similar but not identical to the setting in which reinforcement occurred in the past. Discrimination means that individuals distinguish settings in which reinforcement was previously given. Reinforcement can be provided on a continuous or a partial schedule; the former can be provided on a continuous or a partial schedule; the former leads to rapid learning, but the latter results in learning that is more resistant to extinction. Chaining and successive approximation are effective reinforcement procedures for building desirable behavior. With regard to punishment, its timing and intensity are important variables, as is the adult-child relationship in which it is used.

Observational learning is a function of viewing the behavior of others. Its possible effects consist of direct imitation and counter-imitation, as well as inhibition and disinhibition, both of which involve generalization. Observational learning occurs in three steps: exposure, acquisition, and acceptance. Any complete account of observational learning must involve the variables that influence these steps. Thus we must consider characteristics of the stimulus, observer, and model, including vicarious consequences—the consequences that accrue to the model as a result of his or her action. Inasmuch as this analysis also focuses on internal events, such as memory and coding, it moves away from the traditional S–R account into the realm of complex thinking processes.

In demonstrating the "learning to learn" phenomenon, Harlow provided a model for the way in which complex learning processes can be built on relatively simple learning experiences. Learning theorists, such as the Kendlers, have turned to the concept of mediation to explain discrimination learning. The original stimulus results in an internal label that, in turn, leads to the response. This work and research in memory indicate that children use mediators early but that efficiency grows progressively. The ability to actually produce the mediators is critical. Research into hypothesis testing demonstrates growing sophistication in children's ability to process information to solve discrimination problems.

Cognitive Development

CHAPTER

7

OUTLINE

PIAGET'S THEORY
- The Sensorimotor Period (0 to 2 Years)
- The Preoperational Period (2 to 7 Years)
- The Period of Concrete Operations (7 to 11 Years)
- The Period of Formal Operations (11 through Adulthood)

THE HIGHER MENTAL PROCESSES
- Mental Representation
- Extended Discussion—Modes of Representation and Cognitive Growth: Bruner's View
- Concept Formation
- Reasoning
- Information Processing
- Selection 4—Memory Development in Children

SUMMARY

During the decades when psychologists in the United States were following the strict behavioristic approach of John B. Watson (see Chapter 1), relatively little was learned about children's thought, language, and intellectual functioning. Watson recognized that such processes, with the possible exception of simple speech, were largely internal events; accordingly, he rejected them as inappropriate topics for research. Gradually, his radical approach has given way. We saw in the study of learning, for example, that even behaviorally oriented investigators have begun to use the concept of mediation, which assumes that influential internal processes intervene between children's exposure to external events and their reactions to them. Spurred on by promising findings, developmental psychologists have made enormous progress over the past few years in understanding internal processes. The focus of this chapter is on the fundamental questions that are now being asked—and answered—about the unfolding of the child's ability to build internal models of the world and to manipulate those models so as to explain the past and draw conclusions about the future. This ability is the essence of "cognition" (Carroll, 1964).

The study of cognitive development is now one of the most exciting and active areas of psychological research. It involves thought and memory, to be taken up in this chapter, and intelligence and language, which are discussed in Chapters 8 and 9. Singularly important to this burgeoning of interest has been the work of Jean Piaget, the renowned Swiss psychologist whose theory of cognitive development has had enormous impact on contemporary developmental psychology.

PIAGET'S THEORY

Major theorists differ as to how much of developmental change stems from experience with the environment and how much stems from maturation guided by the blueprint of genetic inheritance. Piaget takes the position that both forces profoundly influence development, and this emphasis on the biological as well as the environmental origins of change is harmonious with his lifelong interest in the biological sciences. Piaget's first intellectual inquiries were in zoology, a branch of biology

FIGURE 7–1
Jean Piaget, the Swiss psychologist whose stage theory of cognitive development focuses on the interaction of nature and nurture. Courtesy of Wayne Behling.

dealing with the animal kingdom, and his current psychological theory reflects sensitivity to the human species' position in that kingdom. A central concept in the field of biology is the notion of *adaptation*. To maintain a favorable interchange with the environment, all animals must adjust to ecological change. Herds instinctively seek new grazing in a drought, while chameleons change color to conceal themselves from predators. Humans too have unique methods of adaptation. More than any other animal, we rely on the acquisition and use of higher mental processes.

Piaget sees the child's cognitive adaptation in terms of two basic processes, *assimilation* and *accommodation*. Assimilation is a process whereby the child interprets reality in terms of his or her internal model of the world constructed from previous knowledge. Accommodation is the complementary process of improving one's model of the world by adjusting it to external reality. Consider the following illustration of the role of these two processes functioning in service of adaptation:

> Suppose an infant of 4 months is presented with a rattle. He has never before had the opportunity to play with rattles or similar toys. The rattle, then, is a feature of the environment to which he needs to adapt. His

> subsequent behavior reveals the tendencies of assimilation and accommodation. The infant tries to grasp the rattle. In order to do this successfully he must accommodate in more ways than are immediately apparent. First, he must accommodate his visual activities to perceive the rattle correctly; then he must reach out and accommodate his movements to the distance between himself and the rattle; in grasping the rattle he must adjust his fingers to its shape; in lifting the rattle he must accommodate his muscular exertion to its weight. In sum, the grasping of the rattle involves a series of acts of accommodation, or modifications of the infant's behavioral structures to suit the demands of the environment.
>
> Grasping the rattle also involves assimilation. In the past the infant has already grasped things; for him, grasping is a well-formed structure of behavior. When he sees the rattle for the first time he tries to deal with the novel object by incorporating it into a habitual pattern of behavior. In a sense he tries to transform the novel object into something that he is familiar with; namely, a thing to be grasped. We can say, therefore, that he assimilates the object into his framework.
>
> Adaptation, then, is a basic tendency of the organism and consists of the two processes of assimilation and accommodation. How do the two relate to one another? First, it is clear that they are complementary processes. Assimilation involves the person's dealing with the environment in terms of his structures, while accommodation involves the transformation of his structures in response to the environment. Moreover, the processes are simultaneously present in every act. When the infant grasps the rattle his fingers accommodate to its shape; at the same time he is assimilating the rattle into his framework, the grasping structure. [Ginsburg and Opper, 1969, p. 19]

In Piaget's system there is a unique term for the infant's miniature models of the world, implied in the preceding passage by the words "habitual pattern of behavior" and "grasping structure." The term is *schema.* A schema is the structure underlying a sequence of behaviors, such as grasping. Schemata* differ in complexity, but even the simple grasping schema organizes the actions of reaching, finger-curling, and drawing in. As the infant gains experience, it will learn to grasp in different ways—e.g., "for something far away," "for something nearby," "for something small," "for something large," and so on. The grasping schema then becomes a kind of category or underlying strategy which subsumes a collection of distinct but similar action sequences. Infants develop many schemata, such as grasping, scanning, and searching. Although those schemata start out isolated from each other, they eventually coalesce into a coherent and coordinated blueprint of how to react to the world of objects (Flavell, 1963).

Schemata formed during early infancy either change or give way to increasingly sophisticated models of the world which emerge in later life. But the child's changing way of viewing the world, his or her level of cognitive development, does not change in an entirely smooth or continuous fashion. Rather, Piaget feels that the emergence of intellectual sophistication and an adult view of the world involves four distinct periods of cognitive development:

**Schemata* is the plural form of *schema.*

1. Sensorimotor period (0 to 2 years)
2. Preoperational period (2 to 7 years)
3. Period of concrete operations (7 to 11 years)
4. Period of formal operations (11 through adulthood)

Note, though, that the ages shown are only approximate averages and will vary considerably with the environment and background of the child.

THE SENSORIMOTOR PERIOD (0 TO 2 YEARS)

Though untutored by experience, the newborn infant is not completely helpless because he or she is born with inherited reflexes. During the two years of the sensorimotor period certain reflexes, among them sucking and grasping, which initially are as inflexible as the jerk of the knee to the tap of the doctor's hammer, will evolve into flexible and plentiful movements. By the end of the period the child will be able to maneuver a stick through playpen bars or open the door with hands full—but not at the beginning. Piaget casts the sensorimotor period in terms of six successive substages.

FIGURE [illegible]
During the sensorimotor period infants begin to construct reality by integrating sensory and motor experience. Photo by [illegible]

Stage 1 This stage is estimated to occupy approximately the first month of life and involves merely the increasingly smooth and systematic use of natural reflexes. The infant is said to engage merely in "reflex exercise." But even at this stage, only one month after birth, evolution toward greater sophistication can be observed.

> Piaget sees evidence suggesting that there are subtle and limited, but nonetheless genuine, accommodatory modifications in the reflex almost from the first hours of life. For example, Laurent[2] shows minimal but definite progress in distinguishing and localizing the nipple as opposed to the surrounding skin areas. It is not so much that the sucking pattern itself—the actual form of the response—gets modified, but rather that the environmental conditions which trigger it off or the instrumental activities leading up to it undergo slight variation. (Flavell, 1963, p. 90)

Stage 2 During the second stage, from the first to approximately the fourth month of life, the infant begins to display a class of behavior called *circular reactions*. A circular reaction is a sequence of events consisting, "first, of stumbling upon some experience as a consequence of some act, and second, of trying to recapture the experience by re-enacting the original movements again and again in a kind of rhythmic cycle. The importance of circular reactions lies in the fact that it is the sensory-motor device par excellence for making new adaptations, and of course new adaptations are the heart and soul of intellectual development at any stage" (Flavell, 1963, p. 93). *Primary circular reactions* are typical of Stage 2. They are repetitive acts that center on the infant's own body; thumb-sucking, frequently seen in three- and four-month-old infants, is a good example.

Stage 3 Between the fourth and eighth months of life *secondary circular reactions* appear. Circular reactions at this stage are aimed at maintaining environmental events originally brought about by chance. For example, suppose the infant accidentally shakes a rattle and hears a noise. The infant will repeatedly try to shake it in order to hear the noise again—perhaps unsuccessfully at first. Interestingly, this action pattern requires the coordination of two action patterns heretofore used separately, that is, grasping and hearing. Typically, coordination between previously isolated behaviors occurs during this stage. Thus, for example, the first coordinations between vision and movement take place at this time.

> The baby starts grasping and manipulating everything he sees in his immediate vicinity. For example, a subject of this age catches hold of a cord hanging from the top of his cradle which has the effect of shaking all the

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[2] Many of Piaget's descriptions of the sensorimotor period stem from observations of his own three children—Laurent, Lucienne, and Jacqueline.

> rattles suspended above him. He immediately repeats the gesture a number of times. Each time the interesting result motivates the repetition. . . . Later you need only hang a new toy from the top of the cradle for the child to look for the cord, which constitutes the beginning of a differentiation between means and ends. [Piaget and Inhelder, 1969, p. 10]

Stage 4 Examples such as the foregoing suggest at least the threshold of intelligent behavior. However, it is not until Stage 4 (between the eighth and twelfth months of life) that the acquisition of truly instrumental behavior seems to occur. Piaget finds evidence for this process by setting up problems derived from natural situations and observing the reactions of children. Here is an example in which his son Laurent had to move an obstacle in order to reach a toy:

> Until now [he was seven months and thirteen days old] Laurent has never really succeeded in setting aside the obstacle; he has simply attempted to take no notice of it. . . . For instance . . . [at six months] I present Laurent with a matchbox, extending my hand laterally to make an obstacle to his prehension. Laurent tries to pass over my hand, or to the side, but he does not attempt to displace it. . . . [At seven months, ten days,] Laurent tries to grasp a new box in front of which I place my hand. . . . He sets the obstacle aside, but not intentionally; he simply tries to reach the box by sliding next to my hand and when he touches it, tries to take no notice of it. . . . Finally [at age seven months, thirteen days,] Laurent reacts quite differently almost from the beginning of the experiment. I present a box of matches above my hand, but behind it, so that he cannot reach it without setting the obstacle aside. But Laurent, after trying to take no notice of it, suddenly tries to hit my hand as though to remove or lower it; I let him do it to me and he grasps the box. . . . I recommence to bar his passage. . . . Laurent tries to reach the box, and bothered by the obstacle, he at once strikes it, definitely lowering it until the way is clear. [Piaget, 1952b, p. 217]

Pushing the obstacle aside is now not an "accident"; rather, it is an act recognized as necessary for reaching the object. It seems that secondary circular reactions (which conserve knowledge originally hit upon by accident) combine to launch new behavior which is intentionally goal-directed, as the first glimmer of real intelligence appears.

Stage 5 The fifth stage, twelve to eighteen months, gives rise to *tertiary circular reactions*. In the secondary circular reaction the child tries to recapture an external event by activating the behavior that led to it in an almost stereotyped and mechanical way. In the tertiary circular reaction the infant seems to be exploring the relationship between action and object. The child experiments with objects in order to see, understand, and pursue the novel. Consider the following example of the tertiary circular reaction:

> Jacqueline holds in her hands an object which is new to her; a round, flat box, which she turns all over, shakes, rubs against the bassinet, etc. She lets it go and tries to pick it up. But she only succeeds in touching it with her index finger, without grasping it. She nevertheless makes an attempt and presses on the edge. The box then tilts up and falls again. Jacqueline, very much interested in this fortuitous result, immediately applies herself to studying it. Hitherto it is only a question of an attempt at assimilation . . . and of the fortuitous discovery of a new result, but this discovery, instead of giving rise to a simple circular reaction, is at once extended to "experiments in order to see."
>
> In effect, Jacqueline immediately rests the box on the ground and pushes it. . . . Afterward Jacqueline puts her finger on the box and presses it. But as she places her finger on the center of the box she simply displaces it and makes it slide instead of tilting it up. She amuses herself with this game and keeps it up (resumes it after intervals, etc.) for several minutes. Then, changing the point of contact, she finally again places her finger on the edge of the box, which tilts it up. She repeats this many times, varying the conditions, but keeping track of her discovery. . . . [Piaget, 1952b, pp. 268–272]

Stage 4 children can only construct means to goals by coordinating actions that by chance exist in their repertoires. In contrast, Stage 5 children, through trial-and-error experimentation, actively search for new means. Suppose an infant in a playpen wants a long stick lying outside the playpen bars. The situation is new, and no familiar method of solution is at hand. To find a successful approach the Stage 5 child will use trial and error, performing "experiments in order to see," just as Jacqueline did in Piaget's example. And, eventually, this method will work. Sooner or later the Stage 5 child will tilt the stick parallel to the opening between the bars of the playpen and draw it through.

Stage 6 During the sixth stage, eighteen to twenty-four months of age, the ability to covertly plan without trial-and-error experimentation emerges. This new process is "insight."

> . . . Jacqueline (at 1 year, 8 months, 9 days) arrives at a closed door—with a blade of grass in each hand. She stretches out her right hand toward the knob but sees that she cannot turn it without letting go of the grass. She puts the grass on the floor, opens the door, picks up the grass again and enters. But when she wants to leave the room things become complicated. She puts the grass on the floor and grasps the doorknob. But then she perceives that in pulling the door toward her she will simultaneously chase away the grass which she placed between the door and the threshold. She therefore picks it up in order to put it outside the door's zone of movement. [Cited in Flavell, 1963, p. 119]

The exceedingly important, newly developed process that underlies the emergence of insightful behavior is called *representation*. The process of representation allows the child to search for an appropriate solution through the manipulation of internal symbols instead of physical objects. We shall have more to say about it later.

In his account of the sensorimotor period, Piaget compared fumbling beginnings with subsequent advances in the infant's knowledge of the world. In summary, the six substages of the sensorimotor period describe in orderly sequence the different stretches of terrain through which the infant passes on a journey from automatic, reflexive reactions to planful behavior efficiently coordinated with the infant's own goals and desires.

THE PREOPERATIONAL PERIOD (2 TO 7 YEARS)

The end of the sensorimotor period coincides with the beginning of the preoperational period. Henceforth the child will begin to deal with increasingly complex problems and will gradually come to rely on mental representations in solving them. During the preoperational period, then, the child begins to develop a perspective of the world and displays an increased ability to accommodate to new information and experience. At first, however, the emerging perspective is *egocentric,* meaning that children have trouble understanding that others will often view the physical and social environment differently than they do. Frequently unaware of the possibility of varying perspectives, the preoperational child is an unknowing prisoner of his or her own point of view.

Egocentrism in preoperational thought

In the classic demonstration of egocentrism (Piaget and Inhelder, 1956, Chapter 8), children were seated on one side of a display consisting of three toy mountains of unequal heights and were asked to show how the display looked to a doll seated elsewhere in relation to the display. Piaget and Inhelder found that children under the age of seven or eight generally indicated that the doll saw what they themselves saw. Egocentrism diminishes during the preoperational period by the thrust of contact with friends, siblings, and classmates who convey the fact of their own differing perspectives (Piaget and Inhelder, 1969, Flavell, 1974).

Much recent research has explored the extent of egocentrism in children's thought (Hoy, 1974; Shantz and Wason, 1970; Brodzinsky, Jackson, and Overton, 1972; Masangkay, McClusky, McIntyre, Sims-Knight, Vaughn, and Flavell, 1974). In one study Liben (1975) asked children to describe what a white card looked like both to themselves and to an experimenter (a) when the children wore yellow-tinted sunglasses and the experimenter wore none, (b) when the experimenter wore green-tinted sunglasses and the children wore none, and (c) when the children wore yellow-tinted sunglasses and the experimenter wore green-tinted sunglasses. Almost half of the three-year-olds tested answered correctly, and the four-, five-, six-, and seven-year-olds tested were extremely successful. These results indicate that where the problem is simple enough even three-year-olds show some ability to take another's perspective, though with more difficulty than older children.

The preoperational child's generally limited perspective on the world is not only evident when he or she is asked to take another's point of view. It is a general characteristic of thought processes at this age, reflected in all the child's efforts to solve problems. To better understand just how the preoperational child thinks, let us examine the so-called conservation problems.

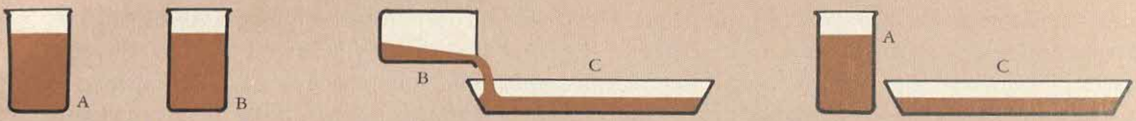
The conservation problems In classical physics there is a law that states that the amount of matter in the universe remains the same through all time, regardless of the form it takes. A similar idea, if on a less grand scale, is held by most adults. If we start with a sack containing exactly ten pounds of sand, and the sack accidentally falls to the floor and breaks, the amount of sand will remain the same—will be conserved—regardless of the change in its location and form. If there were ten pounds of sand in the sack before, there must be ten pounds of sand on the floor now. Piaget's work on the development of the conservation concept has attracted more attention than perhaps any other aspect of his work because he has demonstrated that young children do not reason this way. They fail to appreciate that some features of objects (such as number and length) will remain invariant despite changes in other features (such as shape and position). Children, Piaget posits, fail to understand this idea, the principle of conservation, during the preoperational period and remain uncertain about some of its applications until well into the concrete operational period. Let us consider a research example.

Piaget, Inhelder, and Szeminska (1960) showed four- and five-year-olds two straight sticks of equal length placed on a table with ends carefully aligned. When asked about the relative length of the sticks, the children judged them to be equal. However, when one of the sticks was moved forward a little it was judged to be longer than the other. Finally, when the sticks were realigned, they were again judged to be equal, and, interestingly, the children were not bothered by their inconsistency even when it was pointed out to them. Six- and seven-year-olds, on the other hand, correctly described the sticks as equal in length throughout each of the phases of the procedure.

What distinguishes the two age groups in this situation? According to Piaget's terminology, older children are able to show *conservation*. They understand, at least in this situation, that no change necessarily occurs in one or more aspects of an object or relationship simply because of changes in other, independent features or aspects.

Conservation of *length* is only one of a number of "types" of transformations in the physical universe that reveal cognitive differences in children's understanding. Studies of conservation of *amount*, for example, begin by showing the child two equal-sized balls of plasticene clay. Then, while the subject watches, one of the balls is transformed in shape (e.g., rolled up like a sausage, made into a flat pancake, or divided into several pieces). Children up to about five years of age usually are unable to "see" that the quantity of plasticene has remained constant despite these changes and will identify one of the shapes as now having more clay than the other. By the age of seven or eight they understand that no change in amount occurred (Piaget and Inhelder, 1941).

In tests of conservation of *liquid quantity,* children are presented with two identically shaped beakers of milk and adjustments are made until they agree that each contains the same amount to drink. Then the contents of one of the beakers is poured into a third beaker, which differs in shape from the other two. The transition, which occurs entirely in the child's presence, is depicted in Figure 7–3. The preoperational child is likely to say that beakers A and C do not have the same amount of milk.



STEP 1. The child agrees that beakers A and B contain the same quantity of milk.

STEP 2. The child observes the contents of beaker B poured into a third, different-shaped beaker, C.

STEP 3. The child is then asked to compare the quantity of milk in beakers A and C.

FIGURE 7–3
A typical sequence for studying conservation of liquid quantity.

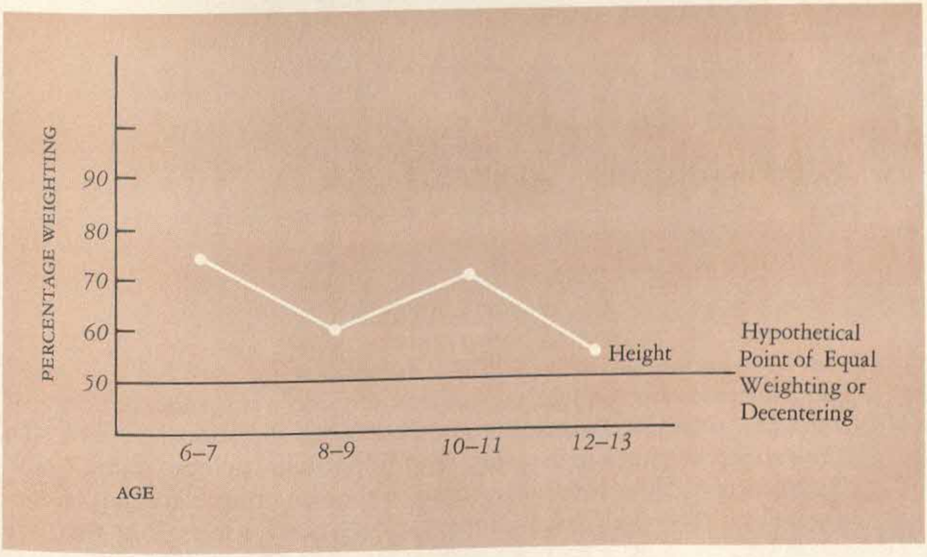
Why does the preoperational child fail to conserve? Piaget and his associates have suggested that the preoperational child fails to conserve because he or she is unable to recognize the operation of certain processes in the physical world. We shall consider three of these processes. First, the preoperational child apparently fails to see the *reversibility* of certain physical operations. If adults were asked how they know that the amount of fluid remains the same in the example provided in Figure 7–3, they might say that if the operation were reversed (if the fluid in beaker C were poured back into beaker B), then the equality would be obvious. The preoperational child, on the other hand, does not appear to recognize this.

A second characteristic of preoperational children that appears to prevent their conserving is *centration.* This notion refers to the tendency to center or focus on a single detail of a question or problem and subsequently to be unable to shift to another detail or dimension. In the conservation of liquid, for example, the child may attend either to the height of the beaker (and thus say that the taller beaker has the greater volume) or to the width (and thus say that the wider and squatter beaker has the larger quantity of fluid). To solve the problem correctly, the child must *decenter*—that is, attend simultaneously to both the height and the width of the beakers—in order to see the relationship between the changes in one of these dimensions and the compensatory changes in the other. Because the column of fluid becomes wider as it gets lower (or taller as it gets narrower), the overall quantity remains the same.

Although it is quite plausible to assume that the preoperational child tends to center upon one of the stimulus dimensions in a conservation problem, there is more than one possible interpretation of why this should occur. Inasmuch as the problems typically involve the use of relational terms (i.e., the experimenter asks: "Which one is *bigger*?"), it is possible that the child's responses result from misunderstanding of the words rather than from deficiencies in logic or perception. The child may, for example, interpret the word "bigger" or "more" to mean "taller" (Braine and Shanks, 1965).

Do younger children fail to conserve simply because they do not understand the meaning of relational terms, or is there a real difference between their mental processes and those of older children and adults? To find out, Kempler (1971) designed a test of conservation in which potentially confusing relational terms were not used at all. He constructed a set of one hundred rectangles of varying shapes and areas, so that almost all the possible combinations of height and width were represented in the set. For example, there were tall, narrow rectangles; short, wide ones; and even rectangles that were in effect perfectly square. The subjects of the study, six- through thirteen-year-old children, were shown the rectangles one at a time and were simply asked to indicate whether each was large or small. Using an ingenious mathematical technique, Kempler was able to take these data and calculate the relative importance children of each age group gave to height and to width in making their judgments of large or small. As seen in Figure 7–4, all the younger children overestimated the importance of height, and equal

FIGURE 7–4
The outcome of Kempler's (1971) experiment, in which younger children were shown to decenter and place disproportional importance on the height of a rectangle when making simple size judgments.



reliance on height and width did not appear except in the twelve- and thirteen-year-old group. This finding suggests strongly that the general problem that Piaget identified in his conservation problems is not reducible to a confusion in word usage on the part of younger children.

A third characteristic of preoperational children that prevents the solving of conservation problems appears to be that they perceive *states* rather than *transformations*. That is, they attend to the series of successive conditions that are displayed in the experiment rather than the process by which the researcher changes or transforms one display into another. It is as if the nonconserving child sees a series of still pictures, whereas a more advanced observer sees a moving picture. The difference is critical, for only by appreciating the transformation or continuous character of conservation problems can we be confident that quantity has remained the same.

To illustrate the preoperational child's tendency to perceive states rather than transformations, one Piagetian experiment involved the use of drawings to identify the perception of successive movements of a bar as it falls from the vertical to the horizontal position. Older children and adults given individual drawings such as those in Figure 7-5 in a "mixed-up" order will immediately arrange them in the correct order of the transformation (i.e., A-F). In contrast, the preoperational child is unable to produce the sequence and may not even recognize the correct sequence when it is presented by the experimenter.

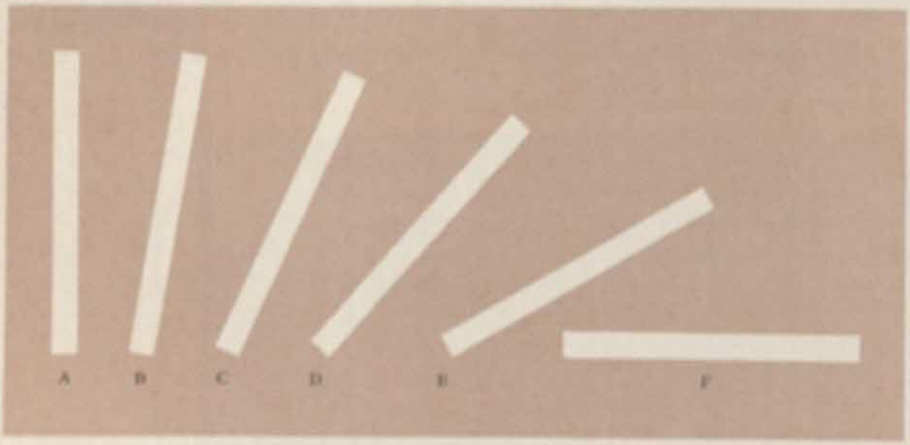


FIGURE 7-5
The "falling stick" problem, testing the ability to recognize transformations. Preoperational children, given separate illustrations (A through F) in random order, cannot arrange them correctly.

Can children learn to conserve? Piaget considers an understanding of conservation to be "a necessary condition for all rational activity." To the extent that such an assertion is even partially accurate, there would be important educational advantages in speeding the acquisition of conservation. Moreover, the paradox of children contending that the amount of milk changes when an experimenter merely pours it from one glass to another has proved an irresistible challenge, especially for those interested in the development of intelligence.

According to Piaget, children below the age of six cannot learn conservation because of a cognitive immaturity that renders all relevant experience useless. The failure of early experimenters to induce conservation in young children was interpreted by some as vindication of this position (Flavell, 1963). More recent experiments, however, have met with greater success, yielding important information about the various means by which children learn about and come to understand the world around them.

Teaching logical operations Certain logical operations are assumed by Piaget to be prerequisites for conservation mastery, and inability to grasp them is said to doom the young child to failure on all conservation problems. Efforts to teach these logical operations and thereby stimulate mastery of conservation have been made in several investigations (Shantz and Sigel, 1967; Sigel, Roeper, and Hooper, 1968). For example, Sigel and his associates (1968) assumed that in order to understand the notion of conservation, children must be able to respond to two dimensions simultaneously. Therefore they gave young children who had failed various tests of conservation practice in utilizing several dimensions at once. Children were asked to list single attributes (color, shape, and function) of common objects. Eventually they were asked to think in terms of two dimensions at once—e.g., "Can you think of two things that you are at the same time?" Training of this sort was supplemented by practice in thinking with reversibility. The majority of four- and five-year-olds who received training showed some increase in comprehension of conservation on a posttraining test, but it also became apparent that logical training alone was insufficient to produce dramatic results.

Teaching relevant skills Kingsley and Hall (1967) have argued that unsuccessful attempts to train conservation almost invariably "ignored the large amount of specific background knowledge necessary and the time needed to train children for conservation mastery." Rather than teaching *logical* prerequisites as Sigel had, Kingsley and Hall concentrated on teaching *skills* directly involved in the task. In training children in the conservation of length (the notion that relative length does not change when two aligned sticks are moved out of alignment), their goal was that the child (1) know the meaning of specific terms (*longer*, *shorter*) used in test questions, (2) know how to measure length with an independent third measuring instrument, (3) know that use of a measuring stick is more accurate than visual cues, (4) know the effects of adding and subtracting length at the ends, and (5) know the effects (or lack of effects) of moving the objects. Each of the five components was taught separately, as were similar skills in a conservation of weight task. The techniques were quite successful. Later, using similar procedures, Rothenberg and Orost (1969) were able to teach conservation of number (the notion that the number of pennies in a row does not change when the pennies are squeezed closer together or spaced more widely apart).

A training procedure like that of Kingsley and Hall raises the question, Is an understanding of conservation derived from direct training good enough to aid children in situations for which they have not been specifically trained? This is the question of *transfer of training*. Kingsley and Hall, who trained children on conservation of length and weight, found improved understanding of conservation of amount, a conservation problem for which no training had been given.

Teaching rules Beilin (1965) was the first to try the most direct approach of all, teaching the child the conservation rule itself. In teaching conservation of length, for example, his experimenters would respond to an error by the child with a clear statement of the rule: "Whenever we start with a length like this one (pointing) and we don't add any sticks to it or take away any sticks . . . it stays the same length even though it looks different. See, I can put them back the way they were, so they haven't really changed." While reciting the rule, the experimenter made the appropriate changes in the object so that the child would have a physical as well as a verbal representation of it. Beilin was quite successful in inducing specific conservation on the training task, but his simple procedures failed to produce significant generalization to related tasks. Later investigators have been much more successful with generalization (Gelman, 1969; Siegler and Liebert, 1972a, 1972b) because they have taken additional steps to bolster the rule training itself.

Gelman (1969) succeeded in obtaining high levels of both specific and general conservation mastery by teaching conservation rules through a discrimination learning procedure similar to the one used by Harlow and Kendler and Kendler (see Chapter 6, pp. 150–155). In this way children were taught that responding to the irrelevant dimensions of a conservation problem (such as position in the conservation of length) produced no rewards, and thus they learned to selectively attend only to the relevant dimensions of each problem. This discrimination learning procedure resulted in a striking degree of conservation mastery. Approximately 90 percent of the subjects achieved perfect posttest scores. More than 60 percent generalized their training to a newly presented conservation of amount problem. A related strategy was later used by Siegler and Liebert (1972a, 1972b) to determine the relative contribution of verbal rules and of feedback to conservation learning. Their experiments indicated that either providing the relevant rules or providing feedback helped children master conservation problems and also demonstrated that providing both rules and feedback was more effective than providing either alone. Gelman's and Siegler and Liebert's experiments conclusively answer the original question of whether four- and five-year-olds can be taught conservation skills. The numerous unsuccessful and partially successful earlier studies, however, attest to the difficulty of inducing conservation in these children.

THE PERIOD OF CONCRETE OPERATIONS (7 TO 11 YEARS)

The period of concrete operations is characterized by an orderliness of thinking which gives rise to the ability to decenter and recognize transformations, awareness that some transformations are reversible, and of course a grasp of the concept of conservation. Flavell contrasts it with the preceding periods as follows:

> . . . the preoperational child differs profoundly from the sensory-motor infant by virtue of the fact that he operates on a wholly new plane of reality, the plane of representation as opposed to direct action. Since the concrete-operational child also operates on the same plane [as the preoperational child], the question arises: what are the differences between the two? . . . It is simply that the older child seems to have at his command a coherent and integrated cognitive system with which he organizes and manipulates the world around him. [Flavell, 1963, p. 165]

The integrated cognitive system of which Flavell writes is an organized network of operations. What kind of mental event is an *operation?* It is an act of representation, such as adding, subtracting, multiplying, or dividing. Piaget has elaborately detailed nine different groupings of logical operations which define the system of concrete operations. However, a consideration of them is beyond the intended scope of this book.*

The accomplishments of the concrete operational stage are many. Besides the ability to conserve, the child has lost much egocentrism and has gained in sensitivity to contradictions inherent in his or her own thought. The child's ability to represent the world symbolically is greatly advanced. Given the accomplishments of children at this age, one may reasonably ask, What sorts of operations can concrete operational children *not* perform? The answer is intriguing.

Although concrete operational children understand relationships among specific events in the environment, they are unable to produce formal, abstract hypotheses. They cannot imagine possible events that are not also real events, and thus they cannot solve problems that involve formal abstractions. As an example, consider Archimedes' law of floating bodies. This principle, which is a formal abstraction, states that an object will float in water if its density (weight per unit) is less than that of water. This law means that, if two objects are of equal weight, the smaller object is more likely to sink than the larger. This fact can give rise to an experimtal test. Specifically, a child is given a bucket of water and several different small objects, some of which will float and some of

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*An excellent discussion of these phenomena can be found in John Flavell's *Developmental Psychology of Jean Piaget* (1963).

which will sink when placed in the liquid. The child's job is to classify the objects in terms of whether they will float or sink, and to look for a rule that will tie the findings together.

Concrete operational children will say such things as "an object sinks because it is iron," "because it is heavy," and so on. They will be troubled and confused, though, by the dilemmas created by such rules (i.e., a piece of wood may be heavier than a bit of rock, but may float while the rock sinks). In contrast, children who have reached the stage of formal operations appear able to abstract the appropriate statement. The phenomenon is illustrated by Piaget's description of one child who, at age twelve years, six months, comes close to a solution, saying in reference to a penny, that "it sinks because it is small, it isn't stretched enough. . . . You would have to have something larger to stay at the surface, something of the same weight and which would have a greater extension" (Inhelder and Piaget, 1958, p. 38).

Concrete operational children are bound up with the world as it is, and they cannot get any further until they begin to delineate all possible explanations at the outset of considering a problem. Only then do they try to discover, systematically, which of the explanations really applies. This advanced way of thinking, in which what occurs in reality is seen as just one among many *possible* alternatives, is part of what makes the thinking of the formal operational child more powerful than it has been at any earlier period.

THE PERIOD OF FORMAL OPERATIONS (11 THROUGH ADULTHOOD)

Beginning with preadolescence, people begin to display the ability to engage in formal reasoning on an abstract level. They can draw hypotheses from their observations, imagine hypothetical as well as real events, and deduce or induce principles regarding the world around them. Efforts to solve the pendulum problem exemplify this final stage of cognitive development.

The pendulum problem

Inhelder and Piaget (1958) have used the following setup to explore formal operational thought. The subject is presented with a pendulum consisting of an object hanging from a string. He or she is permitted to vary the length of the string, change the weight of the suspended object, alter the height from which the pendulum is released, and push the pendulum with varying degrees of force. The problem that must be solved is a classical one in physics: to discover and state which of these factors alone or in combination will influence how quickly the pendulum swings. (In fact, length of the string is the critical variable. The shorter it is, the faster the pendulum swings.) Because the experimenter plays a nondirective role, the way in which the problem is solved tells us much about the cognitive operations of the performer.

Concrete operational children approach the problem unsystematically and soon fail or give up because their chaotic approach leaves them without any real clue to the answer. Formal operational children,

FIGURE 7–6
Youngsters enter into the period of formal operations at about the time when adolescence begins. The ability to conduct scientific experiments depends upon formal operations, according to Piaget. From De Wys, Inc.

in contrast, handle the problem very systematically. First, the adolescent envisages all the possible factors and combinations of factors that could influence the speed of the pendulum: string length, weight, height of release, force, length and height, length and weight and height, and so on. This analysis of possibilities can be exhaustive, and the formal operational child can cast the possibilities into the form of propositions which function as hypotheses. Finally, these hypotheses are put to empirical test. To construct a valid test of each hypothesis the child varies one dimension, such as length of string, while holding all other dimensions constant. For example, a 100-gram weight with a long string will be compared with a 100-gram weight with a short string. The formal operational thinker realizes that an experiment would yield inconclusive results if both weight and string length were varied together because he or she would be unable to deduce which factor produced the difference in speed. Inhelder and Piaget give an exemplary case of a fifteen-year-old who

> . . . after having selected 100 grams with a long string and a medium length string, then 20 grams with a long and short string, and finally 200 grams with a long and short, concludes: "*It's the length of the string that makes it go faster or slower; the weight doesn't play any role.*" She discounts likewise the height of the drop and the force of her push. [1958, p. 75]

As with the conservation problems, the question is, Can children below the age of formal operations learn to master formal operations problems? A series of studies by Siegler and his colleagues (Siegler, 1975; Siegler and Atlas, 1975; Siegler and Liebert, 1975; Siegler, Liebert, and Liebert, 1973) indicates that they can. In one of these studies, Siegler, Liebert, and Liebert attempted to teach the pendulum problem to ten- and eleven-year-olds. The instructional procedure included definitions of key scientific concepts, application of these concepts to particular problems, and demonstration of the use of precise measuring instruments. Roughly 70 percent of the children who were provided such instruction mastered the pendulum problem, compared with less than 10 percent of the uninstructed children. The other studies in the series also testify to the ability of concrete-operations-aged children to learn formal operations concepts, although, in accord with Inhelder and Piaget's findings, these children rarely solve the problems without instruction.

As suggested by Inhelder and Piaget's descriptions and by the type of skills Siegler, Liebert, and Liebert taught to the ten- and eleven-year-olds, the characteristics of the formal operational child are related to those of good scientists. In fact, the intellectual sophistication acquired during the formal operations period seems to be a prerequisite for all scientific thinking. It is with this understanding of the scientific method, according to Piaget, that the basic development of intellectual processes arrives at its most advanced state.

THE HIGHER MENTAL PROCESSES

The course of cognitive development charted by Piaget is accompanied by the concurrent development of several important mental processes which are required for adaptive and intelligent behavior. In this section we will consider mental representation, concept formation, reasoning, and selective attention and memory.

MENTAL REPRESENTATION

Throughout the foregoing discussion of Piaget's theory we saw that the process of mental representation of the world plays a central role in cognitive development, but we have not yet examined the process in any detail.

According to Piaget, a major advance in the child's ability to represent events mentally occurs at about two years of age, corresponding closely with the onset of the preoperational period. At this time the child begins to distinguish what Piaget calls *signifiers* (internal symbols and signs) from *significates* (the actual objects, events, and actions to which signifiers refer). In the following passage, Piaget describes an incident in which his daughter Lucienne, two years old, symbolizes an act not yet performed:

> . . . I put the chain inside an empty matchbox (where the matches belong), then closed the box leaving an opening of 10mm. Lucienne begins by turning the whole thing over, then tries to grasp the chain through the opening. Not succeeding, she simply puts her index finger into the slit and so succeeds in getting out a small fragment of the chain; she then pulls it until she has completely solved the problem.

> Here begins the experiment which we want to emphasize. I put the chain back into the box and reduced the opening to 3mm. It is understood that Lucienne is not aware of the functioning of the opening and closing of the matchbox and has not seen me prepare the experiment. She only possesses the two preceding schemata: turning the box over in order to empty it of its contents, and sliding her finger into the slit to make the chain come out. It is of course this last procedure that she tries first; she puts her finger inside and gropes to reach the chain, but fails completely. A pause follows during which Lucienne manifests a very curious reaction bearing witness not only to the fact that she tries to think out the situation and to represent to herself through mental combination the operations to be performed, but also to the role played by imitation in the genesis of representations. Lucienne mimics the widening of the slit.
>
> She looks at the slit with great attention; then, several times in succession, *she opens and shuts her mouth,* at first slightly, then wider and wider! Apparently Lucienne understands the existence of a cavity adjacent to the slit and wishes to enlarge the cavity. The attempt at representation which she thus furnishes is expressed physically, that is to say, due to inability to think out the situation in words or clear visual images she uses a simple motor indication as "signifier" or symbol. Lucienne, by opening her mouth thus expresses, or even reflects her desire to enlarge the opening of the box. This schema of imitation, with which she is familiar, constitutes for her the means of thinking out the situation. There is doubtless added to it an element of magic-phenomenalistic causality or efficacy. Just as she often uses imitation to act upon persons and make them reproduce their interesting movements, so also it is probable that the act of opening her mouth in front of the slit to be enlarged implies some underlying idea of efficacy.
>
> Soon after . . . Lucienne unhesitatingly puts her finger in the slit and, instead of trying as before to reach the chain, she pulls so as to enlarge the opening. She succeeds and grasps the chain. [Cited in Flavell, 1963, pp. 119–120, italics added]

Of considerable importance for our understanding of the development of mental representation is Piaget's distinction between two kinds of signifiers: symbols and signs. *Symbols* correspond in a relatively private way to the events that they represent and somewhat resemble them physically (e.g., Lucienne's opening and closing her mouth). *Signs,* on the other hand, bear no obvious resemblance to the events they represent; their meanings are arbitrary, but they are shared by other members of the environment (e.g., formal language).

Piaget argues that representational thought does not have its beginnings in social language, but rather in private symbols which form the basis for later acquisition of language. Language development, which we will discuss in detail in Chapter 9, is dependent upon the usage of certain prelinguistic symbols; later, in turn, language fosters further development of private symbols. This basic view, that early mental representation does not rely heavily on language, lies at the heart of the theory of Jerome S. Bruner, to which we now turn.

EXTENDED DISCUSSION

MODES OF REPRESENTATION AND COGNITIVE GROWTH: BRUNER'S VIEW

Bruner has developed a view of the development of representation which is heavily indebted to Piaget's work. Bruner (1964, 1966) suggests that human beings represent the world in three modes: the *enactive*, the *iconic*, and the *symbolic*. The enactive mode involves representation through action. When Lucienne opened and closed her mouth to signify her desire to open and close the box (see p. 183), she used the enactive mode of representation. The iconic mode is representation using visual images, seeing in your mind's eye something that in reality is not in view. The symbolic mode is representation using language. Bruner's use of the term "symbol" coincides with Piaget's use of the term "sign." The earliest mode used by the infant is the enactive mode. At about 1½ or 2 years of age the iconic mode emerges, and after that the symbolic mode appears.

A provocative experiment by Bruner and Kenney (1966) illustrates the difference between iconic and symbolic representation, and also directly supports the claim that iconic representation emerges before symbolic. Bruner and Kenney arranged a set of nine plastic glasses in a three-by-three matrix, displayed in Figure 7–7. Along the vertical edge the glasses increased in height, while along the horizontal edge they increased in width. After acquainting children with the display, the experimenters scrambled the glasses and asked the children to reconstruct or *reproduce* the array exactly as it had been originally. Then the glasses were scrambled once more, but this time the glass that was formerly in the southwest corner of the grid (the shortest and thinnest glass) was placed in the southeast corner. Children were then asked to build an array like the original around the newly relocated glass. In short, they were asked to *transpose* the matrix. Although children ranging in age from three to seven years were tested, it is most interesting to focus on the performance of the five-, six-, and seven-

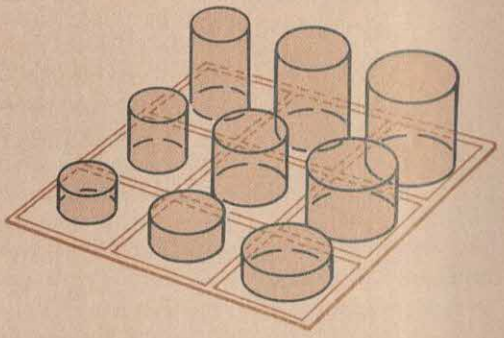
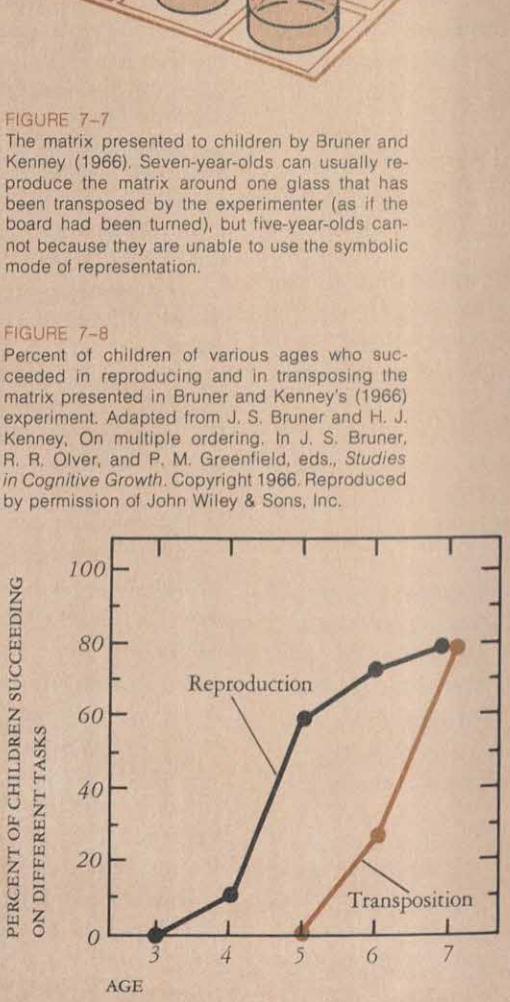


FIGURE 7–7
The matrix presented to children by Bruner and Kenney (1966). Seven-year-olds can usually reproduce the matrix around one glass that has been transposed by the experimenter (as if the board had been turned), but five-year-olds cannot because they are unable to use the symbolic mode of representation.

FIGURE 7–8
Percent of children of various ages who succeeded in reproducing and in transposing the matrix presented in Bruner and Kenney's (1966) experiment. Adapted from J. S. Bruner and H. J. Kenney, On multiple ordering. In J. S. Bruner, R. R. Olver, and P. M. Greenfield, eds., *Studies in Cognitive Growth*. Copyright 1966. Reproduced by permission of John Wiley & Sons, Inc.



year-olds. On the reproduction task a majority of the five-, six-, and seven-year-olds responded correctly. On the transposition task however, none of the five-year-olds and only a small fraction of the six-year-olds succeeded. Not until the seventh year did the task become performable (see Figure 7–8).

Bruner and Kenney suggested that five-year-olds, not old enough to have mastered the symbolic representation required for this task, had to rely on the iconic mode. These children had a visual image of the original array in memory, a sort of picture taken at the time the array was seen and then stored away. They responded to the problem by reading this image and making a copy of it for the experimenter. However, children cannot copy an image of the original as a means of solving the transposition task because they cannot get any match between the transposed glass the experimenter has placed on the board and the picture they have in their heads. Thus, five-year-olds fail at the transposition task because they are being asked to reproduce something they have never seen before. But many of the seven-year-olds succeeded, and we must ask why.

The older children, according to Bruner, had translated their information about the array into the symbolic mode. In short, they used a set of verbal rules to guide them, such as "It gets fatter going one way and taller going the other." Being able to render the matrix into a verbal or symbolic formula allowed the child to preserve and recognize the basic structure of the matrix despite rotation.

CONCEPT FORMATION

A *concept* is an abstract grouping of experiences that helps to reduce their complexity. Some concepts are truly abstract, such as the concept of happiness, while other concepts define categories of objects or events which are themselves quite concrete. The concept "ball" encompasses a set of concrete instances that are likely to be seen in similar situations; consequently, this concept appears quite early in the young child's repertoire of abstractions. Developmental psychologists have asked two broad questions about children's concepts: How are they formed during the course of development? How are they used by children in various situations?

As in other areas, Piaget has contributed a great deal to our understanding of the development of concepts, especially in his investigations of the concept of object permanence. According to Piaget, during the sensorimotor period children gradually make a discovery that will mark their interactions with the world for the rest of their lives. They learn that objects encountered in the world have a permanent existence independent of their own perceptions. The heart of the progression can be seen by following the concept of object permanence through the six substages of development that occur during the sensorimotor period (Flavell, 1970a).

Stages 1 and 2 (0 to 4 months) Most researchers seem to agree with Piaget that the infant does not have the concept of object permanence at this early age. In a technique used by Bower (1970), among others, objects are made to "vanish" by sliding a screen between them and the

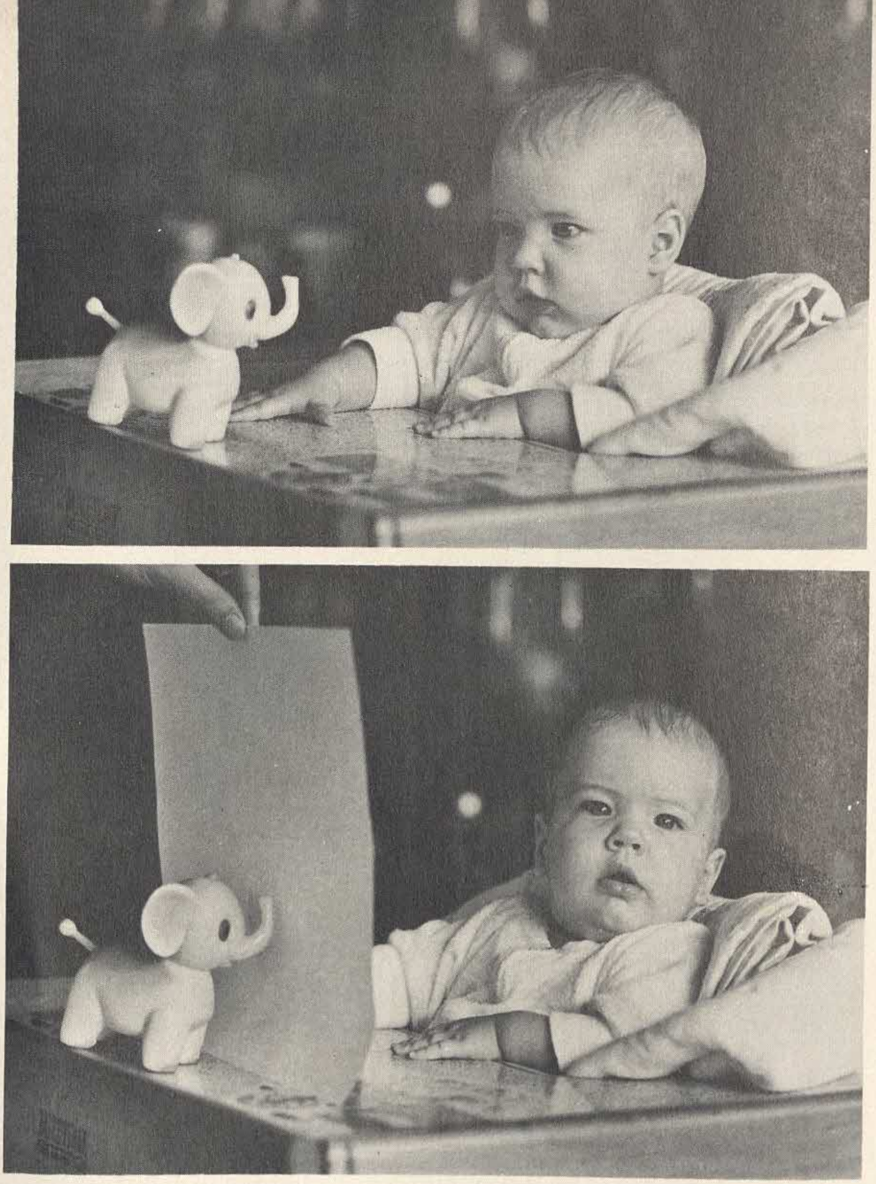


FIGURE 7-9
Young infants do not yet have the concept of object permanence. When a toy is taken out of sight, here by interposing a simple screen, it is also out of mind for the infant. Photo by Zimbel, Monkmeyer.

baby. The infant acts as if the object no longer exists, a sort of "out of sight, out of mind." More interesting is the fact that most infants will seem less surprised if the object is missing when the screen is moved away than if it is still there.

Stage 3 (4 to 8 months) Infants at this stage seem to have the first glimmerings of object permanence and will try to regain visual contact with an object that has disappeared from view. We would only expect this reaction, of course, if the infant believed that the object did still exist, somewhere. But the concept is far from completely formed, as the following description of the Stage 3 child shows:

> First, the child makes a primitive beginning at regaining contact with absent objects by extrapolating the accommodatory movements made to them during their presence; thus he may lean over to look for an object that fell to the floor rather than simply stare at the point where it disappeared from view, as would have been the case in Stages 1 and 2. Second, he acquires the ability to anticipate a whole object on the basis of seeing only a part of it. However, his behavior in this situation also testifies to the immaturity of his object concept: if a sufficient fraction of the object shows from behind the screen, he reaches for it; if this fraction is then made to decrease, the reaching hand abruptly drops. More generally, it is characteristic of this stage that the child makes no attempt to retrieve an object manually once it has disappeared from view (e.g., by being covered with a cloth), in spite of the fact that such activity would by this age be well within his physical capabilities. [Flavell, 1970a, p. 1010]

Stage 4 (8 to 12 months) At this stage children will begin to search regularly for objects they have seen disappear, first only if the object has just been seen a moment ago and then even after periods of considerable delay. But there is a wrinkle, for the search process itself betrays that the child is not yet integrating what has been seen with what has been done. Baldwin (1967) provides this example, which can be repeated by anyone who has two pillows of different colors and a small object that can initially capture the infant's interest:

> The object is put under the red pillow and the child is allowed to retrieve it. Then, while the child watches, it is placed under the red pillow, taken out, shown to the child, and placed under the blue pillow. The question is, where will the child look for it? *At Stage 4, he looks under the red pillow.*
>
> What does this mean? It actually represents an important failure in the child's understanding. The belief that objects continue to exist when they are invisible also requires some belief that objects are located at some point in space. When objects move they go to the point at the end of the path of movement. Therefore, we look for objects where they were last seen or at the end point of the pathway we think they followed. This strategy for recovering vanished objects is in some ways the exact opposite of what the child discovered in Stage 3, namely, to repeat the action that produced the interesting event. When the child obtains the object from under the red pillow and now looks for it there even though he has seen it put under the blue one, he is repeating the action that found him the object last time rather than looking for it where he saw it. [Baldwin, 1967, p. 213, italics added]

Stage 5 (12 to 18 months) The Stage 5 child is able to recognize that he or she must search for missing objects where they were last seen and that this factor is more important than where the object was found before on previous trials. Even so, the concept is not yet complete because the child cannot yet infer invisible displacements. Flavell, for example, describes a child at this age who watches an experimenter carry a small object across a room in his closed hand and then deposit it in a hiding place. The child is only partly able to see this happening; that is, he or she sees the hand movements of the experimenter but does not catch a glimpse of the object itself during the transfer. Rather than going to the hiding place, the child first goes to the experimenter's now empty hand —for that is where the object was actually seen last.

Stage 6 (18 to 24 months) The completion of the development of the concept of object permanence occurs during this stage and has been well described by Flavell:

> At the end of the sensorimotor period the child becomes capable of representing whole sequences of invisible but inferable displacements, for example, if object-in-closed-hand is transported in succession to hiding places *A, B, C,* and *D,* the child will systematically search in all of them (and in the hand), as if he knew exactly what the possibilities were. At this point in development, Piaget is ready to credit him with a full-fledged concept of the independent and enduring object. [Flavell, 1970a, p. 1010]

Where do concepts come from? According to Piaget, such concepts as object permanence spring from assimilation and accommodation by the child in the world of objects and do not depend on language. However there are other concepts, like "brother," "red," and "on time." How are these concepts acquired? According to Benjamin Whorf (1956), the development of at least some concepts *is* influenced by the language that the child learns to speak:

> We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way—an agreement that holds through our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one. But its terms are absolutely obligatory; we cannot talk at all [unless we subscribe] to the organization and classification of data which the agreement decrees. [Whorf, 1956, p. 214]

Carroll and Casagrande (1958) report a study that lends some support to Whorf's suggestion. Two groups of Navaho children were studied, one group came from families where Navaho was spoken and the other came from families where English was spoken. The Navaho language has an interesting feature which English does not have, namely, certain verbs—such as the verbs "to pick up," "to drop," or "to hold in the hand"—require special forms, depending on the shape of the object handled. There is a special verb form for round spherical objects, for round thin objects, for long flexible objects, and so on.

Given this special feature of the Navaho language, the experimenters expected that Navaho-speaking children would show awareness of shape before English-speaking Navaho children. The two groups were compared with respect to how often they used shape rather than color as a basis for sorting some objects. Carroll and Casagrande's results showed that Navaho-speaking children did indeed tend to sort according to shape before English-speaking children did, and these findings suggest that in some instances language may play a role in concept development.

REASONING

Reasoning is essentially the manipulation of symbols in a sequence in order to arrive at a decision or an evaluation. According to Piaget, the child is first able to reason coherently at about seven or eight years of age, the age of concrete operations.

What led in part to this conclusion was research conducted by Piaget and his colleagues on transitive inference (Piaget and Inhelder, 1956; Piaget, Inhelder, and Szeminska, 1960). A *transitive inference* involves the following kind of reasoning process: if A is greater than B, and B is greater than C, then A is greater than C $(A > B, B > C, \therefore A > C)$. Piaget and his colleagues asserted that the young child cannot coordinate the first two premises, $A > B$ and $B > C$, and thus cannot arrive at the appropriate conclusion. This finding, however, led to controversy (Smedslund, 1963, 1965; Youniss and Murray, 1970).

Bryant and Trabasso (1971) speculated that what in previous studies looked like an inability to draw inferences might simply be memory failure. To ensure that children remembered the necessary premises correctly, Bryant and Trabasso conducted experiments in which children thoroughly rehearsed them. Recall of the premises was assessed at the time that the child's ability to make transitive inferences was tested. Results showed that six-, five-, and even four-year-olds could make transitive inferences reliably when they had rehearsed the premises well. Like foregoing research in this area, however, Bryant and Trabasso's work has not escaped controversy (DeBoysson-Bandies and O'Regan, 1973; Harris, 1975; Youniss and Furth, 1973). Nevertheless, their work suggests that children may be able to reason logically well before the age of seven or eight.

INFORMATION PROCESSING

The processes we have talked about so far, such as reasoning and the ability to perform logical operations or symbolize events, all involve manipulating already processed sensory experiences, bits of information, in order to perform a cognitive task or solve a demanding problem. But none of the processes would be of much value unless the raw material for thought, information itself, were available. Human information processing is just beginning to be recognized as a subarea of cognitive psychology, so our knowledge is still rudimentary. But two aspects of information processing have been explored sufficiently to enable a developmental picture to emerge: selective attention and memory.

Selective attention Some of the earliest research in psychology asked, How much information can the mind simultaneously survey? Early answers to this question (Hamilton, 1859, as cited by Posner, 1973) as well as later ones (Miller, 1956) have suggested that the adult mind can encompass only about seven discrete pieces of information at one time. In short, our capacity for simultaneous processing of information is very limited. In order to cope with limited capacity, humans must be selective in the information they choose to process.

One way to study selective attention is to construct a task for children in which some information is relevant for successful solution and other information is incidental. Performance of the central task can be compared with recall of incidental information. Low incidental learning in combination with successful performance of the central task would indicate selectivity in attention—that is, attention directed primarily to task-relevant rather than task-irrelevant stimuli (Hagen and Hale, 1973).

In a study of this sort by Maccoby and Hagen (1965), seven-, nine-, eleven-, and thirteen-year-old children were briefly shown an array of cards. Each card depicted an object like a scooter or a toy train against a distinctively colored background. With the array of cards out of view, the child was shown a cue card of the same color as one of the displayed cards. The central task was to recall the location in the array of the card that matched the cue card. After fourteen arrays, the child was tested on the central task, and then incidental recall was measured by asking the child to match each picture with the background color on which it had appeared. The results indicated that while performance on the central task improved with age, there was a decline in the amount of incidental information children recalled as they got older. Selective attention to task-relevant information apparently is a developmental process, and a major part of the development occurs during middle childhood.

The notion of selective attention has been discussed in other contexts in earlier sections of this book. Piaget's notion of *centration* involves a kind of selective attention. A process similar to selective attention may also underlie the "learning to learn" phenomenon observed by Harry Harlow (Chapter 6), in which youngsters who generally made many errors at the beginning of a series of discrimination-learning problems gradually came to solve such problems in a single try. Selective attention is probably also involved in gaining facility with "reversal shifts," as studied by Kendler and Kendler (1962, Chapter 6). Finally, in the work of Fantz (1958b), Salapatek and Kessen (1966), and Kagan (1967) there is evidence of selection attention, albeit of a less sophisticated kind, in the perception of infants (Chapter 5). In a thorough review of research on selective attention, Pick, Frankel, and Hess (1975) point out the child's continuous need for selectivity in thought, perception, and memory.

As can be seen from the work of Maccoby and Hagen (1965), attentional processes greatly influence memory. It is to the general topic of memory development that we now turn.

Memory An accurate memory is essential for solving all problems that require the coordination of information. As just one of the many examples, consider how impossible it would be to draw the conclusion that $A > C$ when the premise $A > B$ is remembered but the premise $B > C$ has been forgotten. We noted earlier that the child's ability to remember improves with age, and we also suggested some of the reasons for this (pp. 156–158). In Selection 4, written especially for this book, developmental psychologist Peter Ornstein examines children's memory from a somewhat different viewpoint. His perspective is dominated by the possibility that human memory is like computer memory, a contemporary information-processing approach that has recently led to advances in understanding the ability to remember.

SELECTION 4

MEMORY DEVELOPMENT IN CHILDREN

Peter A. Ornstein, University of North Carolina at Chapel Hill

Memory is usually thought to improve with age, at least until the years of early adulthood. Anyone who has observed children even casually knows that adults and older children seem to be better at remembering things than are younger children. Yet there are situations in which age-related changes in memory performance are not obtained. In this selection we will discuss some of the conditions under which developmental changes in memory are and are not obtained. The main focus will be upon the identification of factors that appear to account for observed developmental improvements in memory.

Memory appears to be multifaceted. Some memories seem to us to be very transitory, whereas others are more long lived. On the other hand, certain memories seem to be primarily visual, while others clearly seem verbal. Because of these complexities, since we are really dealing with different aspects of a memory system (which itself is embedded in a more complex cognitive system), it is helpful—indeed some would argue necessary—to work within the context of a framework for viewing memory. There are many such frameworks or models available, and the choice is to some extent arbitrary, but the important thing is to use such a framework to guide our thinking about memory and its development. My colleagues and I have chosen a model that makes a clear distinction between the component parts of memory and the techniques or strategies that individuals use to "operate" this memory system.

A MULTI-STORE MODEL OF MEMORY

Many psychologists find it useful to distinguish between at least three components of the memory system. A typical division, suggested by Atkinson and Shiffrin (1968, 1971), includes (1) a sensory register, a type of early sensory memory; (2) a short-term store, a temporary working memory;

Preparation of this paper was facilitated by grant HD-08459 from the United States Public Health Service. Thanks are due David F. Bjorklund and Kathleen Corsale for critical comments on an earlier version of this paper.

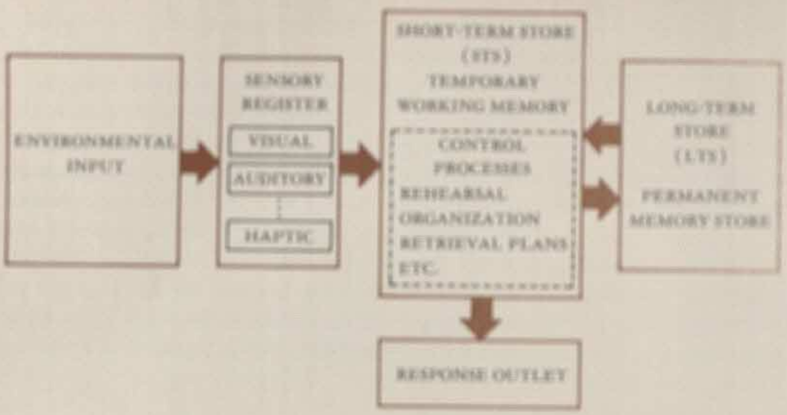


FIGURE 1
Movement of information within memory system. After Atkinson and Shiffrin, 1971.

and (3) a long-term store, a permanent storehouse of information (See Figure 1).*

Information from the environment arrives through the senses and is held briefly in a sensory store (the sensory register) of relatively large capacity. Some of this incoming information, once it is identified and categorized, can be passed along to the short-term store and then to the long-term store. Figure 1 presents an overview of the memory system.

To get a feeling for the visual sensory register (there are assumed to be separate memories for each modality, but we will only consider the visual system here), imagine that you are seated in front of a tachistoscope. A *tachistoscope* is a device for the controlled presentation of visual stimuli for very short intervals. As you focus your eyes upon a fixation point, a 3 × 3 matrix of nine numbers is flashed at you for a period of only 50 milliseconds (1/20th of a second). If, after a second or two, you were asked to indicate the stimuli that had been presented, you would probably be able to recall only four or five items. Yet you would have the clear feeling that you saw more than you were able to remember.

What accounts for this feeling? Is it possible that you actually saw all nine items but that your memory for this material faded very rapidly? That this is probably the case is suggested by the results of "partial report" experiments in which subjects are required to recall only one randomly determined row of the original 3 × 3 matrix (Sperling, 1960). Since the subject does not know which row will be tested until after the stimulus display has terminated, performance on the partial report is assumed to indicate the capacity of the sensory register. If the test comes immediately after the display is removed, adult subjects can report all three numbers on a given row, suggesting that the entire matrix of nine numbers is available in memory. However, if the test is delayed by only one second, performance drops markedly. Partial report data provide support for a sensory register of relatively large capacity, the contents of which are subject to quite rapid decay.

Information in the sensory registers exists in a raw sensory (visual, auditory, etc.) form, which is easily lost from memory. Before it can be labeled and recalled—even in the partial report experiment—this raw sensory information must be categorized and recognized by means of comparisons with information already stored in long-term memory. Thus the visual representation of the letter *A* may be present in the sensory register, but the subject cannot label this stimulus as an *A* until this visual input has been matched by a pattern recognition process with alphabetic information located in permanent memory. Once stimuli have been thus "identified," they can be "transferred" into the short-term store.

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*Other models could be chosen to guide our discussion—such as one that emphasizes the extent to which to-be-remembered information is processed (Craik, 1973)—but the multistore formulation seems particularly useful for developmental analysis.

Short-term store is assumed to be a temporary working memory with a quite limited capacity. In a sense, this is a record of the current contents of consciousness. Psychologists often study the properties of the short-term store by presenting small groups of stimuli to subjects to remember under various conditions. Retention is usually examined at different time intervals, ranging from an immediate test to delays of up to thirty seconds or so. Rather than describing these experiments, attention to an everyday short-term memory phenomenon—the experience of trying to remember a telephone number long enough to get to the phone to dial it—will suffice. As you can tell from your own experience with novel telephone numbers, only a limited amount of information can be held in short-term store at any given time. Furthermore, this information can be rapidly lost from memory—especially as a function of external interference—but certain operations (such as repeating the numbers to yourself again and again, *rehearsal*) can serve to prevent this loss and indeed to maintain information indefinitely. Information in the short-term store may also be transferred to long-term store by active attempts at rehearsal and other processing techniques.

Long-term store is conceived of as a permanent repository of information. This memory store contains, essentially, our knowledge of the world, and its capacity is assumed to be very great. Once material has been transferred to long-term store, there seems to be very little—if any—loss of information. Failure to remember material in long-term store is often viewed as an inability to retrieve stored information rather than as an actual loss from memory. Support for this view is seen in experiments showing improved recall when subjects are given "retrieval cues" to assist in remembering previously presented information (see, e.g., Tulving and Pearlstone, 1966).

The contents of long-term store are indeed varied. Represented in this component of the information-processing system are pattern recognition and linguistic information, so that incoming stimuli—sounds, letters, words, sentences, objects, etc.—can be identified and interpreted. That aspect of long-term store that contains information necessary for comprehension of language has been termed "semantic memory" (Tulving, 1972). In addition, the long-term store contains our memory for past events, the specific "subject matter" of bodies of knowledge we have learned, as well as the rules that govern our behavior. Material that is present in short-term store can, under some conditions, be transferred to long-term store. Given that the long-term store is such a vast storehouse of information, it is examined by psychologists in numerous ways.

Atkinson and Shiffrin have provided much support for the utility of this threefold division of memory into the component parts of sensory register, short-term store, and long-term store. With a computer analogy in mind, these components are viewed as the structural features, or the "hardware," of the memory system. These stores are likened to the various memories that are built into computers. Atkinson and Shiffrin contrast the structural features with the "control processes" used to operate the memory system. These control processes include rehearsal techniques, attempts at imposing organization and structure upon material that is to be remembered, the formation of mental pictures *(visual images)* and search and retrieval plans.

Again with the computer analogy in mind, these various strategies are viewed as the "software" of the human memory system. Just as computer software (in the form of computer programs) controls the operation of computing machines, so control processes are thought to affect the movement of information through the memory system.

To review, Figure 1 represents a schematic diagram of such a conceptualization of memory. As material is acquired it presumably passes through the sensory register and into the short-term store. Control processes such as rehearsal permit the transfer of this material to long-term store, from which it may be subsequently retrieved. Actually, although not indicated in this diagram, long-term store enters the picture in a number of different ways. First, information from long-term store is necessary to permit pattern recognition and identification of raw sensory information held in the sensory register. Second, information that has been sufficiently rehearsed or organized is thought to be transferred to long-term store. Finally, the very control processes that are assumed to govern the movement of information through the system must be represented in some way (as rules) in long-term store.

DEVELOPMENTAL CHANGES IN MEMORY

Use of a framework such as that shown in Figure 1 suggests where to look for possible developmental differences in memory abilities. In principle, there could be age-related differences in the hardware of memory (e.g., sensory register, short-term memory). On the other hand, the major developmental changes could be represented by the acquisition of skills that govern the operation of the memory system, or the software of memory. As it turns out, findings from several areas suggest that the latter alternative may, on the whole, be correct. Minimal developmental changes are observed in the capacities of the sensory register and the short-term store.*

The sensory register

Although sensory memory in children has not been studied extensively, available data (Haith, 1971; Sheingold, 1973) suggest that the capacity of the visual sensory register (not much is known about other sensory modalities) is relatively constant over at least the range from five to twenty-one years of age. To study this, Sheingold (1973) utilized an adaptation of the partial report techniques employed with adults. Four groups of subjects (from five-year-olds to adults) were presented with a group of eight geometric figures in a circular array. The figures were presented by means of a tachistoscope for a very brief interval. Then, after varying delay intervals, the subject's memory for the display was tested. Instead of asking for recall of all of the items—or of the locations of the items—the subjects were probed on each trial for only one of the items. This represents a random sampling of the information that should be available in memory. With this procedure, over a group of trials it was possible to get an estimate of the number of items present in memory by multiplying a subject's accuracy score (percentage correct) by eight, the number of items in the array.

The data presented in Figure 2 are derived from Sheingold's experimental procedure. Plotted are the mean number of items (maximum of eight) assumed to be in the sensory memory, as a function of delay intervals between 50 and 1,000 milliseconds. In-

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*The long-term store, however, may be different. Clearly, the contents of the long-term store must change with increases in age and experience. (Age changes in the contents of the long-term store will not be examined directly in this chapter.)

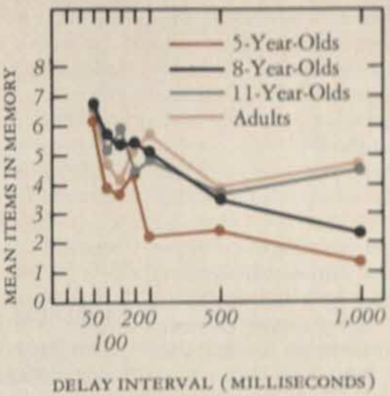


FIGURE 2
Number of items represented in visual memory as a function of delay interval for children of different ages. The results are from Sheingold's (1973) experiment.

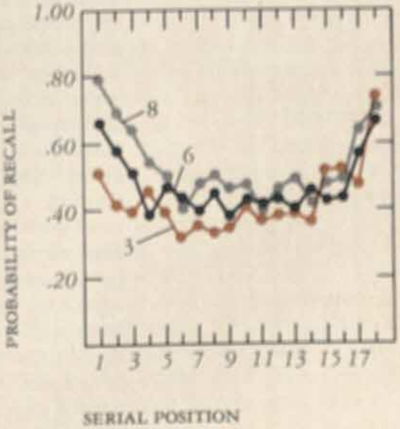
formation is lost for all age groups over an interval as brief as one second (1,000 milliseconds). If we look only at the one-second data, there would be clear differences in the children's memory for visual geometric stimuli. However, inspection of the data for the 50-millisecond delay condition indicates that the age groups are equivalent in performance. Thus, at the first opportunity for a memory test, there were no age differences. There are clear differences, however, in the rate and amount of information loss. These data suggest that subjects of different ages do not differ in the capacity of the sensory register, but rather in the techniques that are used to encode information for subsequent processing in the short-term store.

The short-term store and transfer to long-term store

Several investigators (e.g., Cole, Frankel, and Sharp, 1971; Ornstein, Naus, and Liberty, 1975) have presented evidence consistent with the view that recall from short-term store is equivalent over a wide range of ages. Let us examine this evidence. In a free-recall task a subject is presented with a list of words (say 10–20) to be memorized. Typically the words are lettered on cards or slides (pictures or objects are often used with young children), and the items are presented one at a time at a fixed rate. After the words are presented, recall is tested; subjects are free to recall the items in any desired order. Several alternating presentation (study) and recall (test) trials with the same material are usually given.

In such experiments, recall improves with each presentation of the materials (i.e., over trials). As you would imagine, older children recall more than younger ones. However, an interesting pattern emerges when recall is plotted as a function of serial position (i.e., the order in which the to-be-remembered items are initially presented). Figure 3 presents sample data from such an experiment by Ornstein *et al.* (1975) in which third-, sixth-, and eighth-grade children (eight- to thirteen-year-olds) were asked to learn lists of eighteen unrelated words. The serial position curve represents the proportion of correctly recalled items (probability of recall) broken down in terms of the recall of the first item presented, the second item presented, and so forth.

FIGURE 3
Proportion of words correctly recalled by third-, sixth-, and eighth-grade children as a function of serial position. The results are from Ornstein, Naus, and Liberty's (1975) experiment.



These data indicate that the children are remarkably similar in their recall of the last few list items. Whatever differences in recall exist are observed in the initial and middle sections of the serial position curve.

In the context of models of memory such as that of Atkinson and Shiffrin, recall of the last few items, the "recency" effect, is thought to represent recall from short-term store. In contrast, recall of the beginning items, the "primacy" effect, and to some extent the middle items, is attributed to recall from long-term store. From this point of view, given the equivalent recall of final list items, children of different ages would not be thought to differ in recall from short-term store. The developmental differences in the magnitude of the primacy effect would suggest age-related changes in recall of information from long-term store. The interesting developmental differences in recall may thus represent changes in strategies or control processes that govern the transfer of information from short-term to long-term store, retrieval from long-term store, or both.

Support for this view that strategy differences may account for developmental changes in recall of the initial list items is seen in recent work on children's rehearsal. Rehearsal is well known as a factor that influences the movement of information within the memory system (Rundus, 1971). By making children rehearse aloud in free recall tasks, Ornstein et al. (1975) and others have noted quite different rehearsal techniques or styles, which seem to be correlated with recall performance, and in particular with the magnitude of the primacy effect. Older children appear to rehearse actively, while the rehearsal of younger children is rather passive. For example, sixth-graders tend to group items together more in their rehearsal than do third-graders, who appear to rehearse each item in relative isolation. Ornstein, Naus, and Stone (1977) have demonstrated that young children can be taught to rehearse in a more active fashion and that when this is done, their recall of the initial list items is increased. This facilitation of young children's memory by simple instructions in rehearsal strategy suggests that developmental differences in control processes may account for some of the age changes in the recall of information for long-term store.

A point of view

The data discussed above—as well as other findings (Flavell, 1970b)—lead to the position that much of the developmental improvement in memory that is observed in recall tasks, at least during the school years, involves the learning of strategies and techniques for operating the memory system (software). In contrast, in tasks that tap the structural features of memory and do not permit the operation of mnemonic strategies (see Brown, 1975), minimal if any age differences in memory performance should be found.

The process of learning to operate the memory system involves the acquisition of efficient techniques for storing and retrieving information. Rehearsal and organizing (or grouping) material would be examples of these techniques. In a very real sense we learn appropriate procedures for remembering information. Part of this learning process also appears to include the realization that information already acquired and part of long-term memory can be incorporated into strategies for encoding new material. Often it seems as if young children possess knowledge (i.e., information in memory) that could be used in the formation of mnemonic strategies but that is not spontaneously employed in this fashion. This situation represents a type of distinction between a child's competence and his performance, a distinction between what he knows and his tendency to use that information in a particular memory context. For example, although young children can be shown to know representative examples of certain taxonomic categories (e.g., clothing, foods), they often will not spontaneously organize their recall according to these categories when it would be advantageous to do so (Kobasigawa & Middleton, 1972).

The role of strategies in children's memory will be stressed in the remainder of this chapter. A study concerned with organizational factors will be described to illustrate the development of mnemonic techniques. Organization is selected for discussion because it represents a critical aspect of memory development. Children of different ages can be shown to differ in the extent to which structure is imposed upon material that is to be remembered. Further, young children can be trained in organizational techniques, and recall performance generally improves after such training. Finally, organization is discussed here because it may provide a mechanism by which rehearsal processes influence recall. Ornstein et al. (1975), for example, have speculated that active rehearsal processes "work" because they result in a type of organization when the materials are presented (i.e., at stimulus input).

ORGANIZATION IN CHILDREN'S MEMORY

Adult recall performance depends to a certain extent upon subjects' abilities to organize material that is being committed to memory. Attempts at organization can be inferred in a number of ways. In free-recall tasks (where a word list is memorized and words can be recalled in any order, not just the order of presentation), organizational activities can be observed by examining the order in which words are recalled. If the items to be remembered fall into distinct taxonomic categories (e.g., clothing, food, etc.), organization can be seen in the tendency to recall related items together even if they were not presented together. In fact, an adult's recall of categorized materials depends to a degree upon his ability to recall in "clusters" of related items. Similarly, if the items to be learned are not strongly associated (i.e., if there is no obvious category structure), an adult's performance is linked to his ability to impose a personal or "subjective" organization upon the materials. In this situation, organization can be seen in the extent to which groups of items are recalled in close proximity on adjacent trials.

To what extent can organizational factors account for age changes in recall performance? Although measures of children's organization derived from inspecting the order in which words are recalled have not been uniformly related to developmental changes in recall (Ornstein, Hale, and Morgan, 1975), older children appear to be more adept at imposing a structure upon materials at the time of stimulus presentation.

Age differences in recall and organization

Liberty and Ornstein (1973) presented both fourth-graders (mean age = ten years) and college students (mean age = nineteen years) with a list of twenty-eight items to learn. For example, one of the lists contained the following items: apple, farm, beach, cabin, chair, desk, egg, fence, flower, glass, horse, iron, kitchen, knot, moon, night, ocean, party, room, salt, school, seat, tree, tire, village, wheat, window, and winter. As can be seen, these words are not completely unrelated, nor do they fall into distinct categories. All the children knew these words, and an effort was made to give the subjects considerable freedom in structuring their own relationships among the items. Each word was printed on a card, and the subject's task was to sort the items into groups which would presumably aid subsequent retention. The subjects were told to classify the words according to any desired rule, and remembering as many words as possible was stressed. The twenty-eight words were sorted one by one into bins on a table; only one word in each of the groups formed (the top one) was visible at any time. After all items were sorted (subjects were required to use between two and seven groupings), the subjects were asked to recall as many of the words as they could. This sorting and recall procedure was repeated for six trials, or until the subjects reached a criterion of consistent sorting (i.e., formed exactly the same groups) on two successive trials, whichever came first. With this technique it was possible to look at how the subjects grouped the words prior to each recall trial, and then to examine recall performance.

As Figure 4 indicates, recall improved over trials for both groups of subjects, and the level of performance of the college students was superior to that of the children. In this graph, it should be noted, recall performance is indicated in two ways. First, for those subjects who completed at least four trials prior to reaching the sorting criterion, recall is indicated over trials; second, for all subjects, recall on the final trial is indicated, regardless of whether that trial was a criterion trial or simply the sixth trial.

FIGURE 4

Mean recall as a function of trials for free-sorting adults (A) and fourth-graders (F). These data are indicated both for Trials 1–4 and for the last sorting trial (LT). From Liberty and Ornstein, 1973.

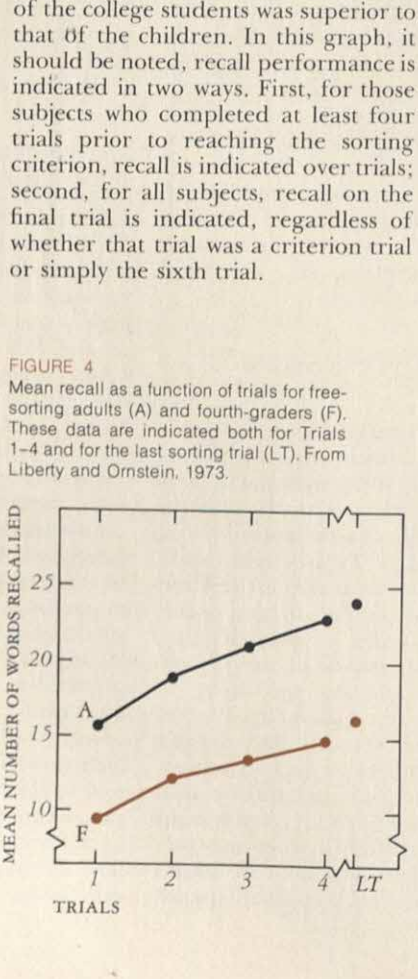


Figure 5 presents some sample-sorting data in the form of a graphic tree-structure representation. In this diagram the scale at the top indicates the proportion of subjects who sorted any group of items together. Thus, examination of the left panel shows that approximately 70 percent of the fourth-graders sorted *flower* and *seed* together. This appears to be a more "compact" grouping than that involving *chair* and *kitchen*, which were sorted together by approximately 55 percent of the fourth-grade subjects. Note that the diagram also indicates "higher order" groupings in that it represents the merging of small groups into larger groups of items. Thus, as indicated above, *flower* and *seed* were sorted together by 70 percent of the fourth-graders, but approximately 58 percent of the subjects also agreed upon the placement of *tree* with *flower* and *seed*. The adult subjects, whose data are shown in the right-hand panel, appear to have grouped the words into four fairly definite content clusters. In contrast, the fourth-graders have structured the items to some extent, but the personal categories formed seem both less distinct (isolated) and less content defined.

The learning of other subjects' sorting styles

The data presented above indicate that the differential sorting of the two groups of subjects is associated with corresponding differences in the level of recall. However, it should be noted that this is only correlational evidence, and an experimental manipulation would be required before we could conclude that organizational differences caused (or contributed to) the recall differences.*

The fourth-graders and college students discussed above were "free

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*As discussed in Chapter 2, the major advantage of the experimental method over the correlational method is that the former allows the investigator to draw causal inferences.

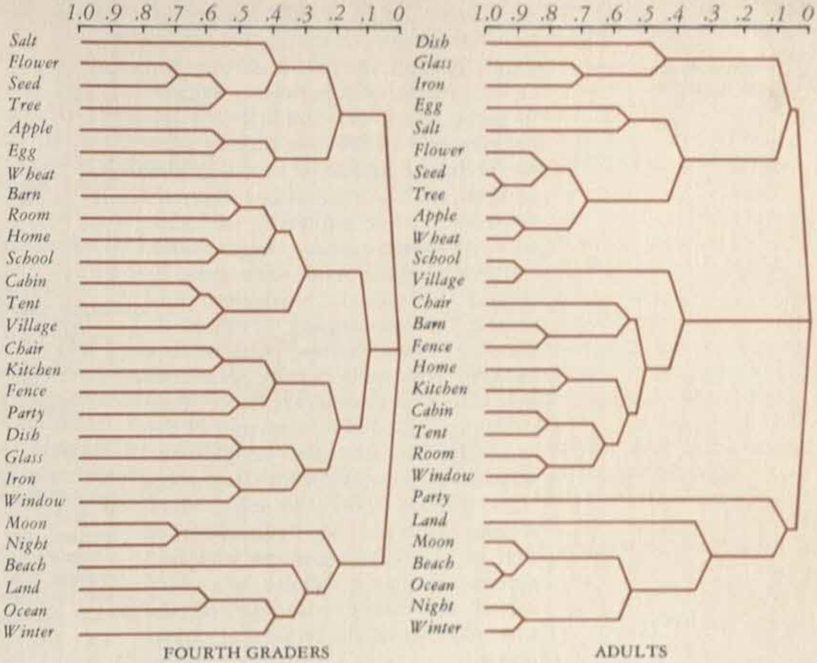


FIGURE 5
Tree-structure diagrams for final sorting trial for free-sorting fourth-graders (left panel) and adults (right panel). From Liberty and Ornstein, 1973.

sorters" in that no constraints were imposed upon them in terms of the ways in which they could classify the words. Subsequent subjects, however, were not free to sort in any desired fashion but rather were required to learn sorting techniques developed by the original free-sorting subjects. If the organizational schemes employed by the adults were at least partially responsible for their superior recall, then children's recall should improve when they are trained in these organizational techniques. Fourth-graders who learn to sort as adults do should demonstrate improved recall, whereas adults who sort according to the patterns of fourth-graders should show a decrement in recall. Thus, in the second part of the Liberty and Ornstein experiment additional groups of subjects attempted to learn sorting patterns that had been used by individual subjects in the first part of the experiment. Each subject was required to sort according to the pattern generated by one of the free-sorting subjects. As each card (containing a to-be-remembered word) was presented, a constrained subject was required to place it into a group that was consistent with the placement of his yoked partner. Sorting was carried out until a criterion of two correct sorts in a row was reached, or until six trials had been completed.

One-half of the fourth-graders in this part of the experiment were constrained to the sorting patterns of adults; the remaining children learned the groupings generated by other fourth-graders. Similarly, one-half of the adults sorted according to children's schemes, and the others learned adult patterns. Learning sorts developed by others proved to be a demanding task (for both age groups), but even though all subjects did not completely learn the constrained patterns to criterion, all groups demonstrated improved sorting over trials. And even though the sorting patterns were not completely mastered, they nonetheless influenced recall performance. Figure 6 indicates recall for these four groups of subjects, plotted both over Trials 1–5 and for the final trial. Inspection of this figure shows that although the recall of the two adult groups is superior to that of fourth-graders, the influence of the organization of the free-sorting partner is clear. Supplying a fourth-grader with an adult's organization improves his recall, while supplying an adult with a fourth-grader's organization causes the adult's recall to decrease. It should be noted, moreover, that yoking or constraining a subject to another subject's sorting pattern is not the critical variable; yoking *per se* does not affect performance, since constraining a subject to a partner of the same age does not affect recall in any way. Thus the recall of fourth-graders who learned other fourth-graders' sorting patterns was equivalent to that of the fourth-graders who free sorted. Similarly, adults who free sorted and those who learned the sorts of other adults recalled at similar levels.

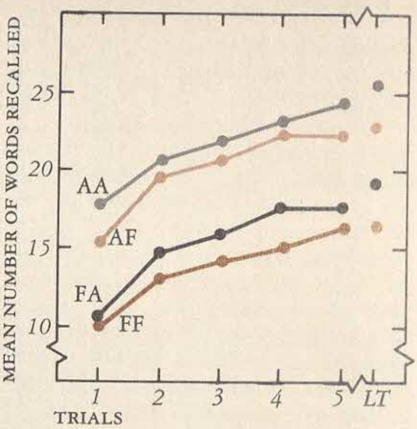


FIGURE 6
Mean recall as a function of trials for constrained sorting conditions (adults yoked to adults, AA; adults yoked to fourth-graders, AF; fourth-graders yoked to adults, FA; fourth-graders yoked to fourth-graders, FF). These data are indicated both for Trials 1–5 and for the last sorting trial (LT). From Liberty and Ornstein, 1973.

Why is the recall of children improved?

These data clearly indicate that training in organizational patterns can affect developmental changes in recall. But no information as to why this training manipulation is successful has been provided. Since ten-year-olds do not spontaneously group to-be-remembered items into semantically (i.e., meaning) based patterns, why should forcing them to group the words in an adultlike fashion lead to improved recall? Data gathered by Liberty and Ornstein at the completion of the free-sorting part of the experiment may shed some light on this question.

It must be emphasized that the differences in the free sorters' grouping patterns (Figure 5) discussed above were obtained in the context of the recall task in which the subjects were free to sort in any desired fashion. The data indicate many differences in the sorting styles of the two age groups, but they do not suggest in any way that the fourth-graders do not know the semantic bases employed by the adults in their sorts. Nor do these data imply that the children could not sort like adults under other circumstances. Information relevant to this point was provided by a final sort which was given to approximately one-half of the free-sorting subjects after the conclusion of the sort-recall task. Here subjects were told to sort those items together that "go together" as opposed to the recall task instructions which stressed sorting according to any rule and maximizing the number of words recalled. Interestingly, under these conditions the sorts of the fourth-graders became very adultlike, indicating that these young subjects "knew" in some sense the basis for the adult sorts; the college-age subjects' sorts did not change. These data suggest that both children and adults had, in permanent memory, information concerning relationships among verbal items employed in the memory task, yet only the adults utilized this information to form strategies for performance in the recall task. The training manipulation—the facilitation of young children's recall by yoking them to the sorting patterns of adults—may have been effective because it enabled the fourth-graders to utilize semantic relationships (which were explicit in the adult sorts) of which they already had some knowledge.

A summing up

These findings indicate the critical role of organizational factors in memory development. Recall performance is influenced considerably by the type of organization imposed on sets of items that are to be remembered. Additional work with the sort/recall procedure (Bjorklund, Ornstein, and Haig, 1976) suggests that children of different ages vary in the extent to which they organize items effectively (by using knowledge already available in long-term memory). The relationship between children's organization and recall has been observed in both a correlational and an experimental fashion. In general, these data are consistent with the view developed earlier that much of memory development can be viewed as the development of techniques or strategies (control processes) for operating upon memory. Organization, searching for interrelationships among to-be-remembered items, and using these items in memorization attempts, represents one such important technique.

SUMMARY

The study of cognitive psychology is having a major impact on the focus and emphasis of contemporary psychology. Jean Piaget has made important contributions to this field and is best known for his identification of four periods of cognitive development.

In the *sensorimotor period,* from birth to two years of age, the child gradually passes through six stages of development, changing automatic reflexive reactions to planful behavior. Several developmental processes are involved in this period: circular reactions, secondary circular reactions, tertiary circular reactions, and representation. The *preoperational period,* from two to seven years of age, is characterized by the child's egocentric perspective, and by limitations in thinking demonstrated by the failure to solve conservation problems. During this period the child fails to see the reversibility of certain physical operations, perceives states rather than transformations, and tends to focus on a single detail of a problem without being able to shift to another dimension. Although Piaget believed that children below the age of six lacked the cognitive maturity to learn conservation problems, several training procedures have been successful in teaching them. In the *concrete operational period,* from seven to eleven years of age, the child acquires an orderliness of thinking that involves the ability to decenter, recognize transformations, and understand reversibility and conservation problems. The last stage, the *formal operations period*, begins with preadolescence and is characterized by the ability to engage in formal reasoning on an abstract level, such as being able to solve the pendulum problem.

The periods identified by Piaget are accompanied by the concurrent development of several important mental processes which are required for adaptive and intelligent behavior. Expanding the work of Piaget, Bruner has identified three modes of mental representation—enactive, iconic, and symbolic. Concept formation develops by the end of the sensorimotor period, with one of the first concepts being that of object permanence; a study with Navaho children suggests that language may play a role in concept development. The ability to reason develops during the concrete operational period, as demonstrated by several studies of transitive inference. Two major aspects of information processing have been identified—*selective attention* and *memory*. There is evidence that even infants attend selectively and that there is a continuous need for selectivity in both children and adults. In studies based on Ornstein's computer model of memory, developmental improvement in memory of recall tasks involves the learning of strategies and techniques for operating the memory system (software), whereas minimal age differences are found for tasks involving the structural features of memory (hardware).

Intelligence

CHAPTER

8

OUTLINE

- THE CONCEPT OF INTELLIGENCE
  - Nature versus Nurture
  - General versus Specific Intelligence
  - Applied Approach to Defining Intelligence
- THE MEASUREMENT OF INTELLIGENCE
  - Principles of Test Construction
- TYPES OF INTELLIGENCE TESTS
  - Tests for Children and Adults
  - Infant Tests of Intelligence
- THE RELATIONSHIP OF EARLY IQ SCORES TO LATER PERFORMANCE
  - Infant Tests
  - Tests Given Later in Time
- THE CONSTANCY OF IQ
  - Selection 5—Adult Status of Children with Contrasting Early Life Experiences: A Follow-up Study
- SOME CORRELATES OF INTELLIGENCE
  - Family Variables
  - Socioeconomic Status, Race, and Ethnicity
  - Extended Discussion—Cultural Bias and Testing
- SUMMARY

In previous chapters we traced basic processes through which the child comes to know and adapt to the world. Learning, perception, memory, problem solving, and constructing reality as described by Piaget can all be considered part of the intellectual development of children. In this chapter intelligence is examined from a different context, one that is intricately related to its measurement.

What is *intelligence?* Despite the vast interest by psychologists in intellectual ability and its measurement, there has been little agreement about definition. Rather, the nature of intelligence has been debated continuously and definitions of it have undergone change as new information has been acquired.

THE CONCEPT OF INTELLIGENCE

NATURE VERSUS NURTURE

As indicated in our earlier discussion of genetics (Chapter 4), one focus of concern about intelligent behavior has revolved around the question of whether it is innate or learned. For the most part, the dominant view, at least until the late 1940s, emphasized innate factors. Underlying this view was a belief that intelligence was *fixed* at a particular level and that it was *predetermined* by heredity (Hunt, 1961). Each of these beliefs was deeply embedded and had some empirical support. For example, animal research provided examples of maturation that were relatively uninfluenced by the environment, such as the development of motor ability in the salamander (p. 65). It seemed not unreasonable, then, that intelligence might also be largely independent of experience. Furthermore, in humans, scores on tests of intelligence were known to be more closely correlated as the degree of relationship between the examinees increased—an indication of genetic influence (p. 84). But evidence that intelligence may be changed, sometimes dramatically, by environmental determinants began to accumulate, transforming the concept considerably. This change will be traced in detail later in the chapter.

GENERAL VERSUS SPECIFIC INTELLIGENCE

In referring to someone as "bright" or "dull," all of us recognize in a general way that individuals differ in their ability to deal with the world. On the other hand, we also are aware that "bright" people may not do everything well and that "dull" people are sometimes remarkably adept at certain tasks. Psychologists also have recognized both the generality and the specificity of intelligent behavior.

Theorists who view intelligence as a general attribute refer to it as the ability to learn; the capacity to adjust or adapt to the environment, especially to new situations; or sometimes simply to all of the knowledge a person has acquired (Robinson and Robinson, 1965). From this point of view, intelligence is a single, general attribute possessed to some degree by each individual.

Other theorists, among them L. L. Thurstone (1941) and J. P. Guilford (1966), regard intelligence as consisting of a number of different attributes or capacities. According to multifactor models of intelligence, an individual may be well endowed with one attribute, but deficient in another. Assuming that intelligence is not general, theorists have sought to discover the nature of the specific factors.

The procedure employed is conceptually quite simple. A group of individuals is given a large number of different tests, each of which purports to measure intelligence. It is assumed that success on some of the tests requires skill in one area, while success on other tests requires skill in other areas. For example, some tests might require skill in memory for verbal material while others might require the ability to work effectively with abstract mathematical concepts. The task of the experimenter is to discover the existence of different groups of tests, each of which requires a different skill. To achieve that objective the experimenter employs a statistical technique called "factor analysis." Cattell (1965) has suggested that the logic underlying this technique is similar to the logic a jungle hunter might use in deciding whether a set of dark blobs in a river is three separate rotting logs or a single alligator. To make this decision the hunter watches for movement. If the blobs move together, it is assumed that they are part of the same structure, an alligator. If, on the other hand, they do not move together, they are not part of the same structure but instead represent three different structures, three logs. Similarly, if changes in performance on one test typically are accompanied by changes in performance on a second test—i.e., they move together—one could assume that the tests are measuring the same attribute or *factor*. It remains then for the investigator to give a name to each factor, usually based on a subjective view of the skill involved.

What specific factors have been identified by the use of factor analysis? Thurstone and Thurstone (1941) concluded that there are seven primary ones: perceptual speed, word comprehension, word fluency, space, number, memory, and induction. They also acknowledged a general factor that operated in all tasks but emphasized that analysis of the several factors is more useful in assessing intellectual ability.

APPLIED APPROACH TO DEFINING INTELLIGENCE

Many psychologists, though, have little interest in theoretical models of intelligence—whether general or specific. Rather, they accept the view that intelligence is not a concrete capacity located somewhere within the individual but a sample of certain behaviors that is useful in describing and predicting other behaviors. This approach is an applied one; it focuses almost exclusively on testing to determine the intellectual tasks individuals can perform or the knowledge they have accumulated. It is expected that test performance will provide helpful information about the present functioning of the individual and, to some extent, about his or her range of future performance on related tasks, such as academic achievement. The application of this approach can be seen in the following discussion of the measurement of intelligence.

THE MEASUREMENT OF INTELLIGENCE

From the beginning of the century, when test construction seriously commenced, until the late 1950s, the testing movement was characterized by expansion into many areas: the selection and classification of men in the armed forces, the admission of college students, the evaluation of progress in educational institutions, and the selection of employees (Holtzman, 1971). It is thus appropriate to consider briefly some of the principles of test construction, as well as examples of the more widely used tests.

PRINCIPLES OF TEST CONSTRUCTION

Initial item selection The first step in constructing any kind of psychological test is selection of appropriate items, that is, of the test questions. The choice will obviously depend upon the purpose of the test and the theoretical stance of the people constructing it.

Norms and standardization Next, the test items must be administered to a representative group of individuals in order to establish *normative* performance. This group, the standardization sample, must be chosen carefully because its scores will be employed as a standard against which later examinees' scores will be compared. For example, if the test is being designed for children of varying ages and socioeconomic backgrounds, the standardization group should include appropriate proportions of individuals reflecting these characteristics.

Still another part of standardization procedures concerns the context within which the test is administered. When classroom tests are given in school, as in spelling or arithmetic, individual teachers may differ widely in their selection of content, the amount of time allowed for taking the test, whether notes may be used, and so forth. Such tests are unstandardized and do not permit direct comparisons from one classroom to another. A child who correctly answered 80 percent of the questions on Mrs. Jones's arithmetic test might very well have learned less—or more—than one who earned the same score on Mrs. Smith's test. If we are to compare many children from different parts of the country, or even different classrooms, successfully, this problem must be overcome. *Standardization of test procedures* is used for this purpose. Specifically, a standardized test is one in which the apparatus, procedure, and scoring have been fixed so that exactly the same test is given at different times and places (Cronbach, 1960, p. 22).

It is sometimes felt that one of the weaknesses of psychological tests is that such standardization does not allow for optimal conditions under which any one individual may perform. This may be true, but if comparison with others is desired, it is necessary that the test be conducted in a standard situation for all individuals.

Reliability Some time after a test has been standardized, efforts must be made to check its reliability. Reliability refers to *the consistency of the test.* If a test is not reliable, it is not useful because measurement could fluctuate haphazardly. One common method of determining reliability is to administer a test to the same individuals on two different occasions. Another consists of administering equivalent forms of the test or items from the same form on separate occasions. In either case the two sets of scores are then correlated—the higher the correlation coefficient, the higher the reliability. Reliability, then, refers to how closely the sets of scores are related or how consistent they are over various time intervals.

Predictive validity According to many psychologists, questions of validity are the most important that can be asked about any psychological test. Simply, *the validity of a test is the degree to which it actually measures what it purports to measure.*

How does one determine validity? Many specific techniques are employed, but all have one feature in common: one or more independent *criterion measures* are obtained and correlated with scores from the test in question. Criterion measures are chosen on the basis of what the test is designed to measure. Anxiety exhibited in a public-speaking situation, for example, might be a criterion measure for a test to evaluate self-consciousness. Thus, if test scores rise and fall as do measures of anxiety, evidence exists that the test enjoys some validity.

The validity of intelligence tests is usually determined by employing, as criterion tasks, measures of academic achievement, such as school grades, teacher ratings, or scores on achievement tests. The reported correlations for the more widely used intelligence tests and these criterion tasks are reasonably high; for example, they fall between .40 and .75 for the Stanford-Binet intelligence test. Furthermore, children who have been accelerated or "skipped" one or more grades do considerably better on the Stanford-Binet than do those who have shown normal progress, whereas youngsters who were held back one or more grades show considerably lower than average scores (McNemar, 1942). So the Stanford-Binet appears to measure intelligence, at least insofar as intelligence is reflected in school performance, and is thus relatively successful in predicting school achievement. Such predictive validity is largely responsible for the wide use of tests of intelligence.

TYPES OF INTELLIGENCE TESTS

In the following sections, examples will be given of a few of the most widely employed intelligence tests. All of the ones discussed are administered individually rather than in groups. Presumably this optimizes the motivation and attention of the examinee and provides an opportunity for the sensitive examiner to assess subjective factors that may influence test performance. The examiner may notice that the child appears relaxed and therefore is probably functioning at an adequate level or may observe that intense anxiety is interfering with performance. Such clinical judgments are not feasible with group intelligence tests. On the other hand, group tests have the advantage of providing information about many individuals quickly and often without the need of highly trained psychologists. For this reason group tests have been used widely for general placement in schools and the like—not, however, without controversy, as we shall see later in the chapter.

TESTS FOR CHILDREN AND ADULTS

The Binet scales In 1905 Alfred Binet and T. Simon, commissioned by the minister of public education in Paris, devised the first successful test of intellectual ability, called the "Metrical Scale of Intelligence." Composed of thirty problems in ascending order of difficulty, its goal was to identify children who were likely to fail in school, so that they could be transferred to special classes. Systematic comparisons thus were made between normal and mentally retarded children. Later revisions of the test in 1908 and 1911 were based on the classroom observations of characteristics that teachers called "bright" and "dull" as well as a considerable amount of trial-and-error adjustment. Scores obtained on them agreed strongly with teachers' ratings of intellectual ability.

Beginning with the 1908 revision, the Binet-Simon test was arranged into age levels. For example, the investigators placed all tests that normal three-year-olds could pass in the three-year level, all tests that normal four-year-olds could pass in the four-year level, and so on up to age thirteen. This arrangement gave rise to the concept of *mental age* (MA). A child's mental age was the age of normal children whose performance he or she equaled. A six-year-old child who passed tests the average seven-year-old passed would be said to have a MA of seven. This procedure, which was simple to grasp as a complement to the youngster's chronological age (CA), did much to popularize intelligence measurement and the mental testing movement generally.

The Stanford-Binet tests The Binet-Simon tests attracted much interest and translations soon appeared in many languages. Louis Terman at Stanford University revised the test into the first Stanford-Binet in 1916. The Stanford-Binet was a new test in many ways; items had been changed and it had been standardized on a relatively large American population including about one thousand children and four hundred adults. Furthermore, Terman and his associates employed the notion of the *intelligence quotient* or IQ—the ratio of an individual's mental age to his chronological age, multiplied by 100 to avoid decimals. Thus:

$$IQ = \frac{MA}{CA} \times 100$$

In conception, this new term was ingenious. If a child's mental age and chronological age were equivalent, the child's IQ, regardless of actual chronological age, would be 100—reflecting average performance. The procedure also made it possible to more directly compare the intellectual development of children of different chronological ages. If a four-year-old boy has a mental age of three, his IQ will be 75 ($\frac{3}{4} \times 100$), as will that of an equally retarded twelve-year-old with a mental age of nine ($\frac{9}{12} \times 100 = 75$).

The Stanford-Binet was revised in 1937 and again in 1960, each time with the inclusion of new improvements and restandardization. The distribution of IQ scores peaks at about 100, and there are approximately as many lower scores as higher ones. Table 8-1 shows the meaning of various scores. For example, if a child obtains a score of 112, he or she has done as well or better than 77 percent of the individuals in the standardization sample. The Stanford-Binet, with its various revisions, has become the standard against which new measures of intelligence are evaluated.

Like the earlier versions, the Stanford-Binet consists of many cognitive and motor tasks, ranging from the extremely easy to the extremely difficult. The test itself may be administered to individuals ranging in age from approximately two years to adulthood, but not every individual is given every question. For example, young children (or older retarded children) may be asked to recognize pictures of familiar objects, string beads, answer questions about everyday relationships, or fold paper into specified shapes. On the other hand, older individuals may be asked to define vocabulary words, reason through to the solution of an abstract problem, or decipher an unfamiliar code. Some of the standardized materials used in the Stanford-Binet children's scales are shown in

TABLE 8–1
THE MEANING OF VARIOUS IQ SCORES OBTAINED ON THE REVISED STANFORD-BINET

THE CHILD WHOSE IQ IS:	EQUALS OR EXCEEDS	THE CHILD WHOSE IQ IS:	EQUALS OR EXCEEDS
62	1 percent	100	50 percent
65	2	106	64
70	3	112	77
76	8	118	86
82	14	124	93
88	23	130	97
94	36	136	99
140	7 out of 1,000		
144	4 out of 1,000		
148	2 out of 1,000		
152	8 out of 10,000		
156	3 out of 10,000		
160	1 out of 10,000		

Source: Reproduced with the permission of the publishers from *Supplementary Guide for the Revised Stanford-Binet Scale* (L) by Rudolph Pinter, Anna Dragositz, and Rose Kushner (Stanford University Press, 1944), p. 135.

Figure 8–1. The examiner determines, according to specific guidelines, the appropriate starting place on the test and administers progressively more difficult questions until the child fails all the questions at a particular level. An IQ score is assigned on the basis of how many questions the examinee passed compared with the average number passed by children of the same age.

The Wechsler scales A second set of intelligence scales widely used in assessment and research with children is based on the work of David Wechsler. The original Wechsler scale, the Wechsler-Bellevue, was published in 1939 and was geared specifically to the measurement of adult intelligence for clinical use. Subsequent revisions involved a special instrument for adults (Wechsler Adult Intelligence Scale, or WAIS) and for schoolchildren (Wechsler Intelligence Scale for Children, or WISC). Still later the WPPSI (Wechsler Preschool and Primary Scale of Intelligence) was constructed to assess children four to six years of age. All of these instruments follow a similar format, which we can examine by looking at the WISC.

Although the WISC bears many similarities to the Stanford-Binet, it differs in several particulars. One major difference is that the subtests are categorized into either verbal or performance subscales, the latter tapping nonverbal symbolic skills. The examinees thus are assessed on

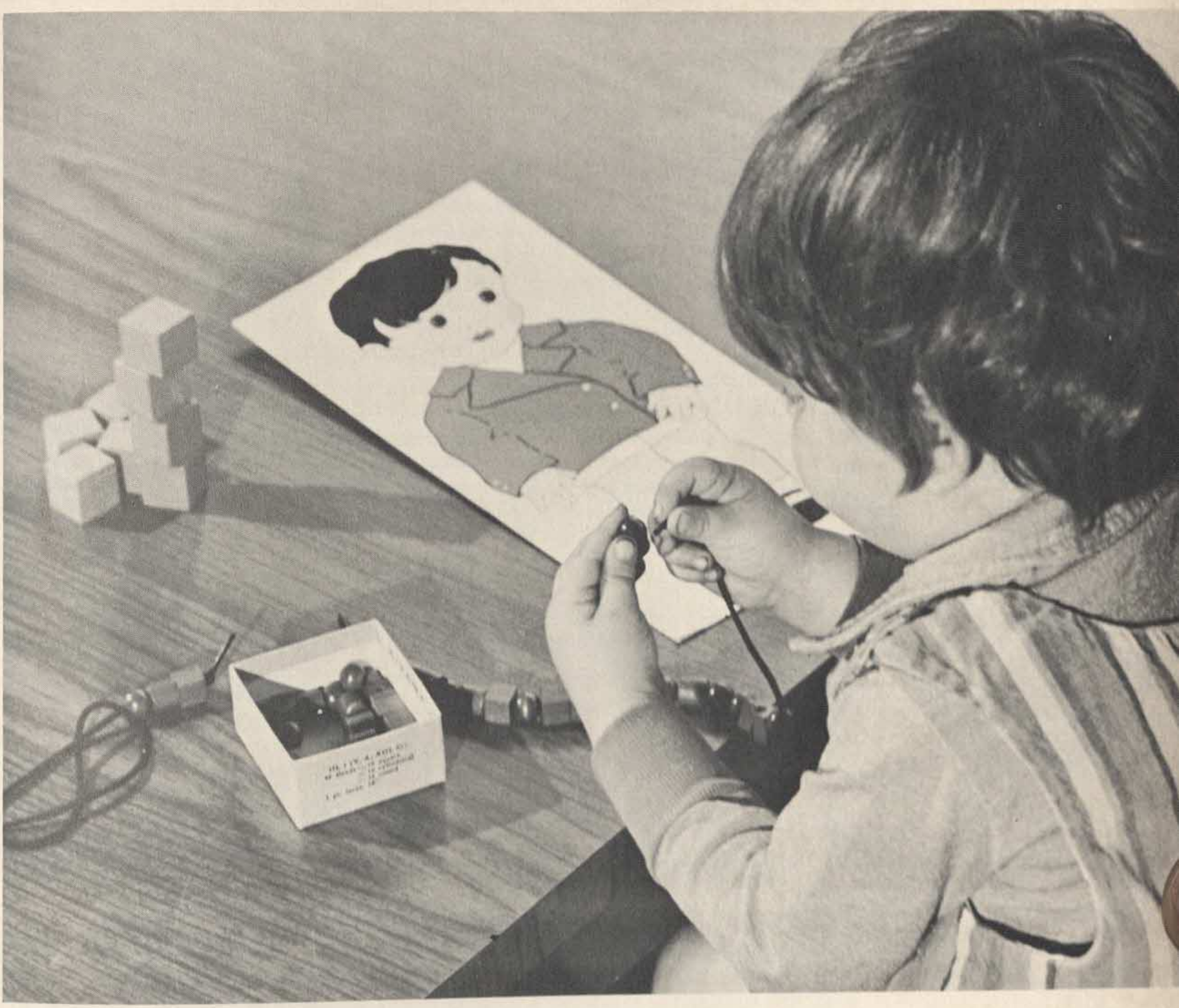


FIGURE 8–1
Some of the test materials used in administering the Stanford-Binet to children. From *Introduction to Psychology* by Norman L. Munn, L. Dodge Fernald, Jr., and Peter S. Fernald. Houghton Mifflin, 1972, by permission of the publishers.

verbal IQ, performance IQ, and a combination of the two, the full-scale IQ. A second major difference is that each examinee receives the same subtests, with some adjustments for either age level or competence or both. The subtests themselves are listed and described in Table 8–2. A third difference is that the individual is not evaluated on the basis of mental age. Rather, his or her score is compared with the average score obtained by those of the same age in the standardization group. The IQ score reflects how near or how far one is from the average score.

TABLE 8–2
THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

VERBAL SCALE	PERFORMANCE SCALE
1. *General information* A series of questions covering a wide range of information which children presumably have had an opportunity to acquire (e.g., "Who discovered America?"). Specialized knowledge is avoided.	1. *Picture completion* Picture cards from which some part on each card (e.g., the whiskers of a cat) is missing. Child must identify the missing parts.
2. *General comprehension* Items in which the child must explain what should be done in given circumstances, why certain practices are followed, and so on. An example: "Why is it better to build a house of brick than of wood?"	2. *Picture arrangement* Sets of picture cards are shown to the child, who must rearrange them so as to tell a story.
3. *Arithmetic* Simple, orally presented arithmetic problems, to be solved without paper or pencil.	3. *Block design* The child is given a set of blocks, with red sides, white sides, and sides that are both red and white and must reproduce a pattern shown by the examiner.
4. *Similarities* Questions such as "In what way are a piano and a violin alike?"	4. *Object assembly* Cardboard puzzles which the child is to assemble.
5. *Vocabulary* Increasingly difficult words are presented orally and visually; the child is asked to tell what each means.	5. *Coding* A code-substitution test in which symbols are to be paired with digits.
6. *Digit span* Orally presented lists of digits, which are to be repeated (in order or backwards).	6. *Mazes* Eight printed mazes are presented; the child must trace in pencil the correct route out.

INFANT TESTS OF INTELLIGENCE

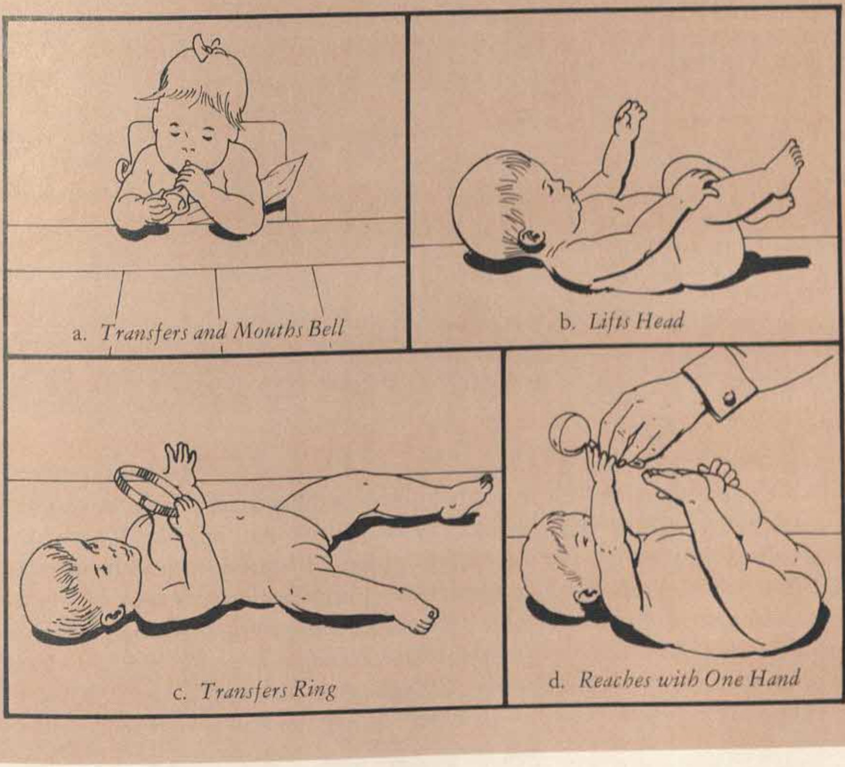
Several individual tests of infant behavior have been developed in the United States during the last fifty years; examples are the Gesell Developmental Schedules, the Cattell Intelligence Tests for Infants and Young Children, and the Bayley Scales of Infant Development. Performance on these tests is labeled DQ, for developmental quotient, rather than IQ.

Gesell's test was the first specifically designed to measure mental ability in early infancy and is the most well known (Bayley, 1970). It evaluates behavior in four basic areas: motor, adaptive, language, and personal-social (Figure 8–2). The latter scale is scored mainly from a parental interview. The child's performance is compared with norms derived from a relatively small group of middle-class children from New Haven, Connecticut, who were followed longitudinally.

The Bayley Scales of Infant Development are a revision of Bayley's original tests, with the addition of a broader standardization and clarification of scoring and administration (Bayley, 1970). Designed for infants two to thirty months old, they consist of Motor and Mental scales and an Infant Behavior Record. The Motor scale includes such items as holding the head up, walking, and throwing a ball. The Mental scale, designed to assess development of adaptive behavior, includes such behaviors as attending to visual and auditory stimuli, following directions, looking for a fallen toy, and imitating. The Infant Behavior Record is a rating of the child on such responses as fearfulness, happiness, endurance, responsiveness, and goal directedness.

FIGURE 8–2

Illustrations from the Gesell Developmental Schedules of behaviors typical at 28 weeks of age. Adapted from Arnold Gesell and Catherine S. Amatruda, *Developmental Diagnosis* (New York: Paul B. Hoeber, Inc.). Copyright 1941, 1947 by Arnold Gesell. By permission.



a. *Transfers and Mouths Bell*

b. *Lifts Head*

c. *Transfers Ring*

d. *Reaches with One Hand*

THE RELATIONSHIP OF EARLY IQ SCORES TO LATER PERFORMANCE

INFANT TESTS

A question frequently asked about intelligence concerns the degree to which early tests predict scores on tests given at later times (see, for example, Lewis, 1976). From a practical standpoint, a strong positive relationship would indicate that assessment early in life would provide information about the child's later performance. In one study, correlations were calculated between tests given at three, six, nine, twelve, eighteen, and twenty-four months with Stanford-Binet scores obtained at five years (Anderson, 1939). As seen in Table 8-3, the relationship was low and tended to decrease as the time span between assessments increased. The low correlation between early and later tests has been shown in many subsequent studies (Bayley, 1955; Honzik, MacFarland, and Allen, 1948; Pease, Wolins, and Stockdale, 1973).

TABLE 8-3
CORRELATION COEFFICIENTS BETWEEN INFANT INTELLIGENCE TESTS GIVEN AT VARIOUS AGES AND STANFORD-BINET IQ AT FIVE YEARS

AGES	NUMBER OF CHILDREN	CORRELATION COEFFICIENTS
3 mos.–5 yrs.	91	.008
6 mos.–5 yrs.	91	−.065
9 mos.–5 yrs.	91	−.001
12 mos.–5 yrs.	91	.055
18 mos.–5 yrs.	91	.231
24 mos.–5 yrs.	91	.450

Source: Adapted from Anderson, 1939.

Some investigators note that predictability from early assessment is higher when more global categories, rather than specific IQ scores, are considered and when clinical judgment is used along with test scores. MacRae (1955) asked examiners to assign infants to one of five categories on the basis of their subjective assessment of test performance; the categories were: superior, above average, average, below average to borderline, mental defective. Correlations with test scores obtained at 9 years 2 months were .56, .55, and .82 when the infant tests had been given at 0 to 11 months, 12 to 23 months, and 24 to 35 months, respectively. Illingworth (1961) has argued that general mental inferiority can be diagnosed during the first year of life. In one study employing modified Gesell tests, histories, and clinical judgment, he predicted deficiency with 75 percent accuracy as it was measured independently at school age. Such success speaks well for the practical benefits of early diagnosis of problems, primarily because it makes it possible to design treatment plans or appropriately place children into adoptive homes (cf. Knobloch and Pasamanick, 1974). But the evidence is still scant that infant tests alone dependably predict the future performance of those who fall into the middle or high range of intelligence scores.

We might ask why predictive power is not greater. One reason is that there is relatively little room for the display of individual differences during the early months of life (Ames, 1967), and so infants can be differentiated only in a global way. Then, too, early temperamental variations (e.g., activity level or reactivity to stimulation) may influence early performance in a manner different from that in which they affect later performance. Another explanation, perhaps the most important, for low predictability is that infant tests tap abilities other than those evaluated on later tests, placing more emphasis on sensorimotor items and less on tasks involving language and abstract problem solving. At first blush it might be expected that early precociousness or retardation on sensorimotor tasks would foretell later intelligence. Bayley suggests, though, that there is little reason to anticipate a strong relation between early simpler functions and the more complex processes that develop later:

> The neonate who is precocious in the development of the simpler abilities, such as auditory acuity or pupillary reflexes, has an advantage in the slightly more complex behaviors, such as (say) turning toward a sound, or fixating an object held before his eyes. But these more complex acts also involve other functions, such as neuro-muscular coordinations, in which he may not be precocious. The bright one-month-old may be sufficiently slow in developing these later more complex functions so as to lose some or all of his earlier advantages. [Bayley, 1955, pp. 807–808]

TESTS GIVEN LATER IN TIME

What happens, then, when test scores obtained by older children are correlated with yet later performance? It generally has been found that the correlations (1) are substantially higher than those for infant tests and (2) progressively decrease as the time interval between tests increases. Figure 8–3 represents the correlations, from several studies, of scores obtained at maturity with those obtained at previous ages. These data clearly show that although the relationship increased progressively as time of testing approximated maturity, even tests obtained during childhood substantially predict later performance.

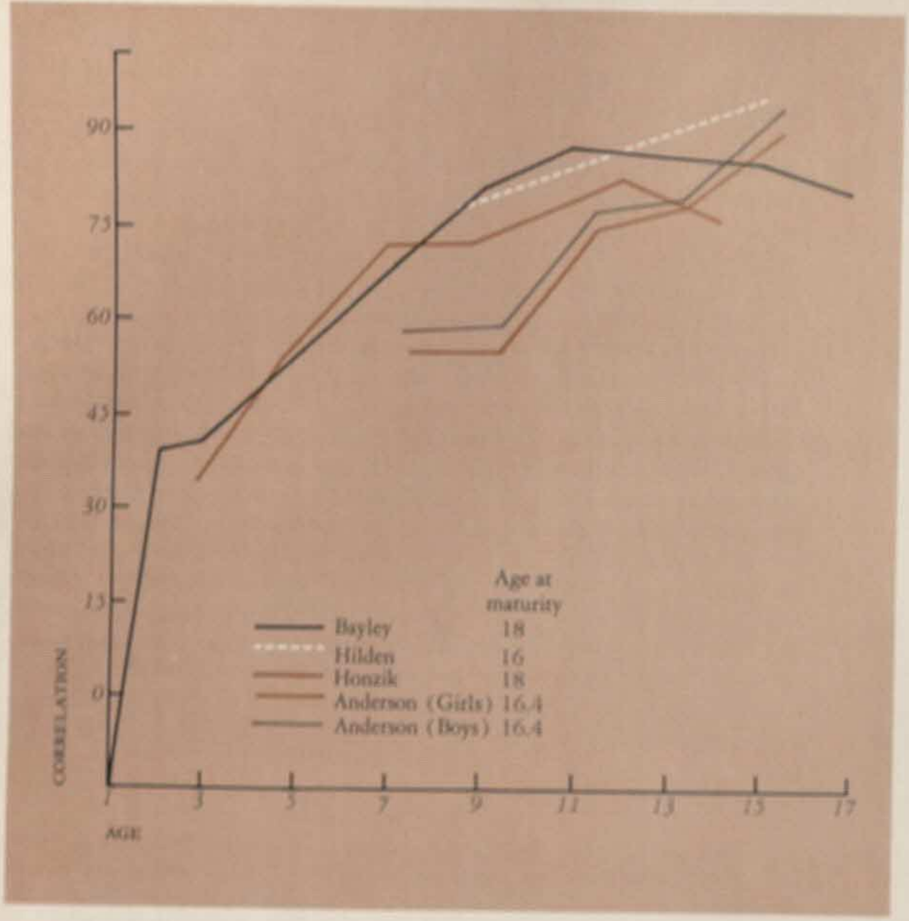


FIGURE 8-3
Correlations between test scores obtained at various ages with those obtained at maturity. The graph lines represent data from different investigations, illustrating the substantial power of tests obtained during early childhood to predict later performance. Adapted from B. S. Bloom, *Stability and Change in Human Characteristics.* Copyright 1964, reproduced by permission of John Wiley & Sons, Inc.

THE CONSTANCY OF IQ

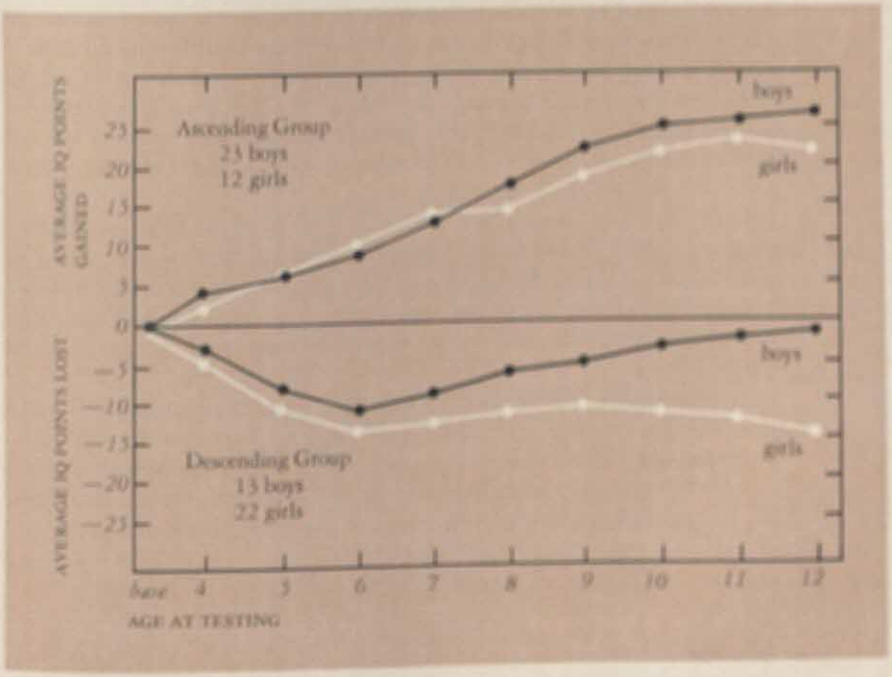
We have already noted that until relatively recently the concept of intelligence was characterized by notions of fixedness and predetermined development. But findings from major longitudinal studies cast doubt on the fixedness of intelligence. Honzik, MacFarland, and Allen (1948), for example, found that almost 60 percent of 252 children in the Child

Guidance Study, tested several times between the ages of six and eighteen years, changed fifteen or more points. As part of the Fels Study, Sontag, Baker, and Nelson (1958) administered the Stanford-Binet several times to children between three and twelve years of age. The large majority did not obtain the same IQ scores, and there was considerable change for some children. Figure 8–4 shows the average gains for the thirty-five children exhibiting the greatest increase and the average loss for the thirty-five children displaying the greatest decline.

In summarizing their own work and that of others, McCall, Appelbaum, and Hogarty (1973) noted that

1. IQ changes of 30 and 40 points are fairly often found.
2. Boys are somewhat more likely to show increases in IQ than are girls, and girls oriented toward masculine roles tend to show more increases than girls not so oriented.
3. Children of low-income families tend to show no change or decrease in IQ scores.

FIGURE 8-4
Mean IQ points gained or lost by children who demonstrated the greatest increases or greatest decline. Adapted from Sontag, Baker, and Nelson, 1958. Copyright 1958 by the Society for Research in Child Development, Inc. Reproduced by permission.



4. Differences in personality have been found between those who show increases and those who show decreases in IQ. Preschool children who gain are independent and competitive; the same is true for elementary school children who gain and they also are self-initiating and problem solving.

The early concept of intelligence was further modified by various investigations that pointed to the specific influence of environmental factors. When these studies were reported, they set off one of the most intense controversies to ever exist in psychology. It all began when Wellman (1932a, 1932b) reported that children who attended preschool in the Iowa Child Welfare Station showed substantial gains in IQ during their attendance that were not attributable to practice effects. Reactions to the reports were strong. One investigator, in a paper entitled "The Wandering IQ: Is It Time to Settle Down?" suggested that the work reflected statistical incompetence influenced by wishful thinking (Stott and Ball, 1965). Arguments flew back and forth, with claims from other preschool studies that such gains did not occur. In some ways this issue is still not resolved.

Another series of investigations compared the mental development of youngsters reared in institutions with that of youngsters reared by their own mothers or caring mother-figures. Spitz (1949) compared two groups of infants—one group had been reared in a foundling home and the other had been cared for in an institutional nursery by the infants' own mothers. The foundling home infants at two to four months had developmental quotients averaging 124, while the mother-reared infants had an average of 100. When the children were tested toward the end of one year, their DQ scores had changed to 72 and 105, respectively. Spitz attributed the results to the lack of conditions that would allow for environmental stimulation and emotional ties between the foundling home infants and their caretakers.

Goldfarb (1943) examined children who had spent most of their first three years of life in an institution and had then been placed in foster homes, with children who had been assigned to foster homes from the beginning. He reported the same pattern of results as had Spitz: the institutionalized children showed more mental retardation and deficient speech.

Harold Skeels (1960) also documented that environmental factors could have an impact on mental development. Due to rather unusual circumstances, he was able to compare orphanage children with a group of children who were transferred from the orphanage to an institution for the mentally retarded, where they received more attention and mothering. In Selection 5 Skeels describes the project and the follow-up examinations conducted as the children passed into adulthood.

SELECTION 5

ADULT STATUS OF CHILDREN WITH CONTRASTING EARLY LIFE EXPERIENCES: A FOLLOW-UP STUDY

Harold M. Skeels, National Institute of Mental Health

INTRODUCTION

. . . The present study is a report on the status as adults of two groups of children originally encountered in Iowa institutions. One group experienced what was then regarded as the normal course of events in a child-caring institution, while the other experienced a specifically designed and implemented intervention program. The findings reported here are concerned with the question of whether and for how long a time mental development is affected by major changes in early environment and, specifically, with the factors significantly associated with deflections in mental development. It is hoped that these findings will contribute to the growing body of evidence on the effects of deprivation and poverty on the young child's ability to learn.

THE ORIGINAL STUDY

All the children in this study had become wards of the orphanage through established court procedures after no next of kin was found able to provide either support or suitable guardianship. Of the 25 children, 20 were illegitimate and the remainder had been separated from their parents because of evidence of severe neglect and/or abuse. Then as now, the courts were reluctant to sever the ties between child and parents and did so only when clearly presented with no other alternative. All the children were white and of north-European background.

The orphanage in which the children were placed occupied, with a few exceptions, buildings that had first served as a hospital and barracks during the Civil War. The institution was overcrowded and understaffed. By present standards, diet, sanitation, general care, and basic philosophy of operations were censurable. At the time of the study, however, the discrepancies between conditions in the institution and in the general community were not so great and were not always to the disadvantage of the institution. . . .

At the time the original study was begun, infants up to the age of 2 years were housed in the hospital, then a relatively new building. Until about 6 months, they were cared for in the infant nursery. The babies were kept in standard hospital cribs that often had protective sheeting on the sides, thus effectively limiting visual stimulation; no toys or other objects were hung in the infants' line of vision. Human interactions were limited to busy nurses who, with the speed born of practice and necessity, changed diapers or bedding, bathed and medicated the infants, and fed them efficiently with propped bottles.

Older infants, from about 6 to 24 months, were moved into small dormitories containing two to five large cribs. This arrangement permitted the infants to move about a little and to interact somewhat with

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those in neighboring cribs. The children were cared for by two nurses with some assistance from one or two girls, 10 to 15 years old, who regarded the assignment as an unwelcome chore. The children had good physical and medical care, but little can be said beyond this. Interactions with adults were largely limited to feeding, dressing, and toilet details. Few play materials were available, and there was little time for the teaching of play techniques. Most of the children had a brief play period on the floor; a few toys were available at the beginning of such periods, but if any rolled out of reach there was no one to retrieve it. Except for short walks out of doors, the children were seldom out of the nursery room.

At 2 years of age these children were graduated to the cottages, which had been built around 1860. A rather complete description of "cottage life" is reported by Skeels et al. (1938) from which the following excerpts are taken:

> Overcrowding of living facilities was characteristic. Too many children had to be accommodated in the available space and there were too few adults to guide them . . . Thirty to thirty-five children of the same sex under six years of age lived in a "cottage" in charge of one matron and three or four entirely untrained and often reluctant girls of thirteen to fifteen years of age. The waking and sleeping hours of these children were spent (except during meal times and a little time on a grass plot) in an average-sized room (approximately fifteen feet square), a sunporch of similar size, a cloakroom, . . . and a single dormitory. The latter was occupied only during sleeping hours. The meals for all children in the orphanage were served in a central building in a single large dining room. . . .
>
> The duties falling to the lot of the matron were not only those involved in the care of the children but those related to clothing and cottage maintenance, in other words, cleaning, mending, and so forth. . . . With so much responsibility centered in one adult the result was a necessary regimentation. The children sat down, stood up, and did many things in rows and in unison. They spent considerable time sitting on chairs, for in addition to the number of children and the matron's limited time there was the misfortune of inadequate equipment. . . .
>
> No child had any property which belonged exclusively to him except, perhaps, his tooth brush. Even his clothing, including shoes, was selected and put on him according to size. [pp. 10–11]

After a child reached the age of 6 years, he began school. His associates were his cottage mates and the children of the same age and opposite sex who lived on the other side of the institution grounds. Although the curriculum was ostensibly the same as that in the local public school, it was generally agreed that the standards were adjusted to the capabilities of the orphanage children. Few of those who had their entire elementary-school experience in the institution's school were able to make the transition to the public junior high school.

The orphanage was designed for mentally normal children. It was perpetually overcrowded, although every opportunity to relieve this pressure was exploited. One such relief occurred periodically when new buildings were opened at other institutions, such as at the schools for the mentally retarded. It was not uncommon for a busload of children to be transferred on such occasions. . . .

The environmental conditions in the two state institutions for the mentally retarded were not identical but they had many things in common. Patient-inmates were grouped by sex, age, and general ability. Within any one ward, the patients were highly similar. The youngest children tended to be the most severely disabled and were frequently "hospital" patients. The older, more competent inmates had work assignments throughout the institution and constituted a somewhat self-conscious elite with recognized status. . . .

Identification of cases

Early in the service aspects of the program, two baby girls, neglected by their feebleminded mothers, ignored by their inadequate relatives, malnourished and frail, were legally committed to the orphanage. The youngsters were pitiful little creatures. They were tearful, had runny noses, and sparse, stringy, and colorless hair; they were emaciated, undersized, and lacked muscle tonus or responsiveness. Sad and inactive, the two spent their days rocking and whining.

The psychological examinations showed developmental levels of 6 and 7 months, respectively, for the two girls, although they were then 13 and 16 months old chronologically. This serious delay in mental growth was confirmed by observations of their behavior in the nursery and by reports of the superintendent of nurses, as well as by the pediatrician's examination. There was no evidence of physiological or organic defect, or of birth injury or glandular dysfunction.

The two children were considered unplaceable, and transfer to a school for the mentally retarded was recommended with a high degree of confidence. Accordingly, they were transferred to an institution for the mentally retarded at the next available vacancy, when they were aged 15 and 18 months, respectively.

In the meantime, the author's professional responsibilities had been increased to include itinerant psychological services to the two state institutions for the mentally retarded. Six months after the transfer of the two children, he was visiting the wards at an institution for the mentally retarded and noticed two outstanding little girls. They were alert, smiling, running about, responding to the playful attention of adults, and generally behaving and looking like any other toddlers. He scarcely recognized them as the two little girls with the hopeless prognosis, and thereupon tested them again. . . . Twelve months later they were re-examined, and then again when they were 40 and 43 months old. Each examination gave unmistakable evidence of mental development well within the normal range for age.

There was no question that the initial evaluations gave a true picture of the children's functioning level at the time they were tested. It appeared equally evident that later appraisals showed normal mental growth accompanied by parallel changes in social growth, emotional maturity, communication skills, and general behavior. In order to find a possible explanation for the changes that had occurred, the nature of the children's life space was reviewed.

The two girls had been placed on one of the wards of older, brighter girls and women, ranging in age from 18 to 50 years and in mental age from 5 to 9 years, where they were the only children of preschool age, except for a few hopeless bed patients with gross physical defects. An older girl on the ward had "adopted" each of the two girls, and other older girls served as adoring aunts. Attendants and nurses also showed affection to the two, spending time with them, taking them along on their days off for automobile rides and shopping excursions, and purchasing toys, picture books, and play materials for them in great abundance. The setting seemed to be a homelike one, abundant in affection, rich in wholesome and interesting experiences, and geared to a preschool level of development.

It was recognized that as the children grew older their developmental needs would be less adequately met in the institution for the mentally retarded. Furthermore, they were now normal and the need for care in such an institution no longer existed. Consequently, they were transferred back to the orphanage and shortly thereafter were placed in adoptive homes.

At this point, evidence on the effects of environment on intelligence had been accumulated from a number of studies. The consistent element in normal mental development seemed to be the existence of a one-to-one relationship with an adult who was generous with love and affection, together with an abundance of attention and experiential stimulation from many sources. Children who had little of these did not show progress; those who had a great deal, did.

Since study homes or temporary care homes were not available to the state agency at that time, the choice for children who were not suitable for immediate placement in adoptive homes was between, on the one hand, an unstimulating, large nursery with predictable mental retardation or, on the other hand, a radical, iconoclastic solution, that is, placement in institutions for the mentally retarded in a bold experiment to see whether retardation in infancy was reversible.

By the time these observations were organized into a meaningful whole and their implications were recognized, individual psychological tests were available for all children in the orphanage. As part of a continuing program of observation and evaluation, all infants over 3 months of age were given the then available tests (Kuhlmann-Binet and Iowa Tests for Young Children), and were retested as often as changes seemed to occur. Retests at bi-monthly intervals were not uncommon. Older preschoolers were re-examined at 6- to 12-month intervals; school-aged children, annually or biennially. Children who were showing marked delay in development were kept under special observation.

Children whose development was so delayed that adoptive placement was out of the question remained in the orphanage. The only foreseeable alternative for them was eventual transfer to an institution for the mentally retarded. In the light of the experiences with the two little girls, the possibility was raised that early transfer to such an institution might have therapeutic effects. If not all, then at least some of the children might be able to attain normal mental functioning. In the event they did not, no significant change in life pattern would have occurred, and the child would remain in the situation for which he would have been destined in any case.

This radical proposal was accepted with understandable misgivings by the administrators involved. It was finally agreed that, in order to avoid the stigma of commitment to a state school for the retarded, children would be accepted as "house guests" in such institutions but would remain on the official roster of the orphanage. . . .

EXPERIMENTAL GROUP The experimental group consisted of the 13 children who were transferred from an orphanage for mentally normal children to an institution for the mentally retarded, as "house guests." All were under 3 years of age at the time of transfer. Their development had been reliably established as seriously retarded by tests and observation before transfer was considered.

At the time of transfer, the mean chronological age of the group was 19.4 months (SD 7.4)* and the median was 17.1 months, with a range of from 7.1 to 35.9 months. The range of IQ's was from 35 to 89 with a mean of 64.3 (SD 16.4) and a median of 65.0. Additional tests were made of 11 of the 13 children shortly before or in conjunction with the pretransfer tests, . . . using the Kuhlmann-Binet again or the Iowa Test for Young Children, and the results corroborated the report scores.

The children were considered unsuitable for adoption because of evident mental retardation. For example, in Case 1, although the IQ was 89, it was felt that actual retardation was much greater, as the child at 7 months could scarcely hold up his head without support and showed little general bodily activity in comparison with other infants of the same age. . . .

CONTRAST GROUP Since the original purpose of the experiment was to rescue for normalcy, if possible, those children showing delayed or retarded development, no plans had been made

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*SD is the abbreviation for *standard deviation*, a measure of the variability in a set of scores.

for a control or comparison group. It was only after the data had been analyzed that it was found that such a contrast group was available because of the tests that were routinely given to all children in the orphanage. To select such a contrast group, therefore, records were scrutinized for children who met the following criteria:

1. Had been given intelligence tests under 2 years of age.
2. Were still in residence in the orphanage at approximately 4 years of age.
3. Were in the control group of the orphanage preschool study (Skeels et al., 1938).
4. Had not attended preschool.

A total of 12 children were selected on the basis of the criteria and became the contrast group. The mean chronological age of the group at the time of first examination was 16.6 months (SD 2.9), with a median at 16.3 months. The range was from 11.9 to 21.8 months. The mean IQ of the group was 86.7 (SD 14.3) and the median IQ was 90. With the exception of two cases (16 and 24) the children had IQ's ranging from 81 to 103; the IQ's for the two exceptions were 71 and 50 respectively. When the children were examined, it was not known that they were or would become members of any study group. The reexaminations were merely routine retests that were given to all children.

At the ages when adoptive placement usually occurred, nine of the children in the contrast group had been considered normal in mental development. All 12 were not placed, however, because of different circumstances: 5 were withheld from placement simply because of poor family histories, 2 because of improper commitments, 2 because of luetic conditions [that is, conditions resulting from syphilitic infection transmitted by the mother], 2 because of other health problems, and one because of possible mental retardation. . . .

Description of experimental and contrast groups

BIRTH HISTORIES The birth histories of the two groups were not significantly different. Prematurity was of particular interest in relation to the initial tests of intelligence, as a somewhat slower rate of mental and motor development or possible brain damage or retardation may be associated with it.

The contrast group contained only one instance of prematurity.

There were two cases of Caesarean section, one in the experimental group (Case 11) and one in the contrast group (Case 18), but no effect on mental development was indicated in either case. . . .

MEDICAL HISTORIES In evaluating the medical histories of both the experimental and contrast groups, little of significance was found in the relation between illnesses and rate of mental growth. . . .

FAMILY BACKGROUNDS Social histories of the children revealed that all in both the experimental and contrast groups came from homes in which the social, economic, occupational, and intellectual levels were low.

Mothers Information relating to education was available for 11 of the 13 mothers in the experimental group and for 10 of the 12 mothers in the contrast group. The mean grade completed by mothers of children in the experimental group was 7.8, with a median at grade 8. Only two had any high-school work; one completed grade 11 and one grade 10 (Cases 3 and 6). In one case, it was doubtful if the second grade had been completed (Case 8). Two (Cases 1 and 5) had dropped out of grade 8 at the age of 16.

In the contrast group, the mean grade completed was 7.3, with a median at 7.5. One mother (Case 19) had completed high school and one had an equivalent of ninth-grade education. . . .

Intelligence tests had been obtained on five of the mothers in the experimental group and on nine of the mothers in the contrast group. The mean IQ for the five mothers of the experimental group was 70.4, with a median at 66. . . . Of the nine mothers tested in the contrast group, only two had IQ's above 70: one, 79 and the other, 84. The other scores ranged from 36 to 66. The mean IQ was 63, with a median at 62.

Fathers Little information was available on the fathers, and in fact, in many cases paternity was doubtful. Ten of the children in each group were illegitimate. . . .

A qualitative analysis of social histories seems to justify the conclusion that within these educational and occupational classifications, the parents represented the lower levels in such groups. Most of the fathers and mothers had dropped out of school because they had reached the limits of achievement and were not, in any sense of the word, average for their grade placements. The same may be said about occupational status.

Description of the environments

EXPERIMENTAL GROUP Children in the experimental group were transferred from the orphanage nursery to the Glenwood State School, an institution for mentally retarded, and were placed on wards with older, brighter inmate girls. The wards were in a large cottage that contained eight wards with a matron and an assistant matron in charge and with one attendant for each ward. Approximately 30 patients, girls ranging in age from 18 to 50 years, were on each ward. On two wards (2 and 3), the residents had mental ages of from 9 to 12 years. On two other wards (4 and 5), the mental levels were from 7 to 10 years, and on another (ward 7), the mental ages were from 5 to 8 years. With the exception of ward 7, the wards housed few or no younger children other than the experimental "house guests." It was planned to place one, or at the most two, children from the experimental group on a given ward.

As with the first two children, who, by chance, were the first participants in the experiment, the attendants and the older girls became very fond of the children placed on their wards and took great pride in them. . . .

The spacious living rooms of the wards furnished ample space for indoor play and activity. Whenever weather permitted, the children spent some time each day on the playground under the supervision of one or more older girls. Here they were able to interact with other children of similar ages. Outdoors play equipment included tricycles, swings, slides, sand boxes, etc. The children also began to attend the school kindergarten as soon as they could walk. Toddlers remained for only half the morning and 4- or 5-year olds, the entire morning. Activities carried on in the kindergarten resembled preschool rather than the more formal type of kindergarten.

As part of the school program, the children attended daily 15-minute exercises in the chapel, which included group singing and music by the orchestra. The children also attended the dances, school programs, moving pictures, and Sunday chapel services.

In considering this enriched environment from a dynamic point of view it must be pointed out that in the case of almost every child, some one adult (older girl or attendant) became particularly attached to him and figuratively "adopted" him. As a consequence, an intense one-to-one adult-child relationship developed, which was supplemented by the less intense but frequent interactions with the other adults in the environment. Each child had some one person with whom he was identified and who was particularly interested in him and his achievements. This highly stimulating emotional impact was observed to be the unique characteristic and one of the main contributions of the experimental setting. . . .

Mental development

The 1922 Kuhlmann Revision of the Binet was used as the standard measure of intelligence, except for two or three tests on children who were 4 years of age or more for whom Stanford-Binet (1916) was used. All examinations were made by trained and experienced psychologists. Test one was the measure of intelligence just prior to transfer. Tests two, three, and the last were given at the end of the experimental period. . . .

Using the t test, the difference for the experimental group between the means of first and last test was statistically significant at the .001 level. Every child showed a gain of from 7 to 58 points. Three children made gains of 45 points or more, and all but two children gained more than 15 points.

The mental-growth pattern for children in the contrast group was quite opposite that of the experimental group. Using the t test, the difference between the means of first and last tests was statistically significant ($p < .001$) but with the exception of one child who gained 2 points in IQ from first to last test, all children showed losses of from 9 to 45 points. Ten of the 12 children lost 15 or more points in IQ over the period of the study.

In the experimental group, children who were initially at the lower levels tended to make the greater gains. The three children classified at the imbecile level on the first examination made gains of 58, 49, and 45 IQ points. Also, the greatest losses in the contrast group were associated with the highest initial levels. Six children with original IQ's above 90 lost from 29 to 45 points in IQ. While this shift may be partially due to regression, there must have been other factors operating to bring about such a large and consistent change. . . .

PARENT SURROGATES AND CHILDREN'S MENTAL DEVELOPMENT A close bond of love and affection between a given child and one or two adults who assume a very personal parental role appears to be a dynamic factor of great importance. Nine of the 13 children in the experimental group were involved in such relationships. The four other children (Cases 2, 9, 10, and 11) tended to be less individualized on the wards, relationships with adults were more general, less intense, and did not involve any individual adult. It is significant that the children who experienced the more intense personal relationships made greater gains than those who were limited to more general interactions. . . .

Two children (Cases 10 and 11) showed little progress on ward 7 over a period of 1½ years. This ward differed significantly from the others in that it housed 8 to 12 children of younger ages (3 to 8 years), and the older girls were of a lower mental level. The attendant on the ward was especially fine with young children but was unable to give much individual attention because of the large number of young children. At one time it was feared that the two children would continue to be hopelessly retarded. However, they were subsequently placed as singletons on wards with brighter girls and, after a period of six months with the more individualized attention, showed marked gains in intelligence.

First follow-up

The experiment ended for each child in the experimental group when the decision was made that he had attained the maximum benefit from his "house-guest" experience. Of the 13, one remained in the institution until adulthood, 5 went directly into adoptive homes from the host institution, 6 had brief periods in the orphanage in transit to adoptive homes, and one was returned to the orphanage for some years and then was committed to the institution for the retarded.

As part of the pre-adoptive procedures and the planned follow-up evaluations, all the children were given individual intelligence tests approximately 2½ years after the close of the experimental period. Thus, the 11 adopted children were tested after approximately 2½ years of living in a family home, and the two children remaining in the institutions, after a similar period of continuing residential care. . . .

The children in the contrast group were still wards of the state institutions and were given routine re-examinations. Those tests that most nearly coincided with the 2-year-interval testing for the experimental group were used for comparison purposes in this study. . . .

MENTAL DEVELOPMENT OF THE EXPERIMENTAL GROUP The mean IQ of the 13 children in the experimental group on the follow-up examination was 95.9 (SD 16.3), and the median was 94.0. For the 11 children who had been placed in adoptive homes after the experimental period, the mean IQ at the time of the follow-up study was 101.4; the range of IQ's was from 90 to 118. Changes in IQ for the 11 children ranged from +16 points to −5 points. The greatest gain (16 points) was made by a child (Case 4) who had been placed in a superior adoptive home; the child (Case 5) showing the only loss was in a home considered to be far below the average of the other adoptive homes.

Losses of 17 and 9 points, respectively, were shown by the two children (Cases 9 and 2) who were not placed in adoptive homes. Case 9 had been returned to the orphanage although it was felt that the move was premature. It was true that she became lost in the orphanage group and received very little, if any, individual attention, but whether her development would have been influenced by a different environment is speculative. Case 2, whose IQ was 77 at the close of the experimental period, had remained in the institution for the mentally retarded and, at the time of the follow-up, was expected to require continuing residential care.

MENTAL DEVELOPMENT OF THE CONTRAST GROUP . . . The mean IQ of the 12 children in the contrast group was 66.1 (SD 16.5), a mean gain of 5.6 points over the last test of the experimental period. Despite this small average gain, 8 of the 12 children showed marked mental deterioration between the initial test and the follow-up test. During the three years following the close of the experimental period, a number of changes were made in the group's living situation. Two children (Cases 15 and 16) were transferred to the Glenwood State School, where they experienced essentially the same type of environment as that of the experimental group, but beginning at an older age. The two were 41 months of age at time of transfer. Thirty-four months following this transfer, Case 16 was examined and obtained an IQ of 80, showing a gain of 24 points. She was returned to the orphanage, therefore, as continued residence in the institution for mentally retarded seemed unwarranted. Case 15, on the other hand, failed to show any gain after 34 months. An examination six months later resulted in an IQ of 52, a 4 point loss.

Six of the contrast children were transferred to the Woodward State Hospital and School following the close of the experimental period. This transfer was made on a permanent basis, inasmuch as mental retardation and lack of development and adjustment made continued residence in the orphanage seem inadvisable. . . .

The children sent to Woodward experienced a different environment from that of the experimental children who had been "house guests" at Glenwood. The children sent to Woodward were much older at the time of transfer and received, in general, less individual attention and had fewer interactions with adults. They interacted primarily with children of a similar or slightly older chronological age who were mentally more retarded. . . .

The three contrast children who remainded in the orphanage after the close of the original study subsequently also experienced a change of environment. Case 20 did not attend preschool but entered kindergarten at 68 months of age, and he had just completed the year in kindergarten when the follow-up examination was given. Case 23 attended preschool one year, kindergarten one year, first grade one year (with a D average in grades), and, at the time of the follow-up examination, was 9 years of age and in the second grade. . . .

The last of the contrast children to be accounted for (Case 25) was paroled to his grandparents immediately following the close of the experimental period. The home was a very marginal one, and the family had been on relief for years. At the time of the follow-up examination at 8 years of age, the boy was still in the first grade, doing failing work, and was continually "picked on" by other children. A recommendation was made to transfer the boy to an institution for the mentally retarded.

THE FOLLOW-UP STUDY OF ADULT ACHIEVEMENT

Statement of the problem

The purpose of this follow-up study was to obtain answers to a few very simple questions: What happened to the two groups of children when they became adults? How were the differences in mental growth in childhood reflected in adult achievement and adjustment? Were the two divergent pathways maintained or did they converge over the years? Were there significant changes indicating improvement or regression within and between groups? Was there a relation between adult status and such factors as social history, health history, or environmental experiences? . . .

The adult follow-up study began 20 years after the postexperimental follow-up (Skeels & Skodak, 1965). The initial task was to locate and obtain information on every single case in the two groups. In a study based on such small numbers, the failure to locate even two or three cases could materially limit the conclusions or impressions. . . .

Nature of interviews

Early in the planning, it had been decided not to give intelligence tests to the subjects, now 25 to 35 years of age, because of the many questions that might arise over their relation to the early childhood tests, and because of the possibility of lack of cooperation. It seemed more appropriate to relate the earlier measures of mental development to the adult educational level, occupation, and general social competence attained by the subjects. Personal interviews were used to secure this information. For the experimental group, the adoptive parents (if living) and the subjects were interviewed, usually separately. . . .

General overall findings

SURVIVAL DATA All 13 subjects in the experimental group reached adulthood. Among the 11 adoptive homes in which subjects were placed as children, both adoptive parents were deceased in two, and the adoptive parents were divorced in one but the adoptive mother had remarried and maintained a relationship with the subject.

In the contrast group, 11 of the 12 subjects were living; one (Case 16) died at the age of 15 while still a resident of the institution for the mentally retarded. None had been placed in adoptive homes.

OCCUPATIONAL LEVELS The 13 subjects in the experimental group were

TABLE 1

EXPERIMENTAL AND CONTRAST GROUPS: OCCUPATIONS OF SUBJECTS AND SPOUSES

CASE NO.	SUBJECT'S OCCUPATION	SPOUSE'S OCCUPATION	FEMALE SUBJECT'S OCCUPATION PREVIOUS TO MARRIAGE
Experimental Group:			
1[a]	Staff sergeant	Dental technician	...
2	Housewife	Laborer	Nurses' aide
3	Housewife	Mechanic	Elementary school teacher
4	Nursing instructor	Unemployed	Registered nurse
5	Housewife	Semi-skilled laborer	No work history
6	Waitress	Mechanic, semi-skilled	Beauty operator
7	Housewife	Flight engineer	Dining room hostess
8	Housewife	Foreman, construction	No work history
9	Domestic service	Unmarried	...
10[a]	Real estate sales	Housewife	...
11[a]	Vocational counselor	Advertising copy writer[b]	...
12	Gift shop sales[c]	Unmarried	...
13	Housewife	Pressman-printer	Office-clerical
Contrast Group:			
14	Institutional inmate	Unmarried	...
15	Dishwasher	Unmarried	...
16	Deceased	...	...
17[a]	Dishwasher	Unmarried	...
18[a]	Institutional inmate	Unmarried	...
19[a]	Compositor and typesetter	Housewife	...
20[a]	Institutional inmate	Unmarried	...
21[a]	Dishwasher	Unmarried	...
22[a]	Floater	Divorced	...
23	Cafeteria (part time)	Unmarried	...
24[a]	Institutional gardener's assistant	Unmarried	...
25[a]	Institutional inmate	Unmarried	...

[a] Male.

[b] B.A. degree.

[c] Previously had worked as a licensed practical nurse.

all self-supporting and none were wards of any institution, public or private. Two, a boy (Case 1) and a girl (Case 6), however, had spent some time in a state correctional school during adolescence. Nevertheless, no member of the group exhibited evidence of antisocial or delinquent behavior, economic dependency, or need for psychiatric or agency support.

Table 1 summarizes the occupational status of the experimental- and contrast-group subjects and their spouses. . . .

The occupational status of the 11 living members of the contrast group was significantly different. The contributions to society of the four residents of state institutions were limited to the unskilled tasks assigned to ward patients. . . .

One boy (Case 24) was an employee in the institution for the mentally retarded in which he had been a patient for many years. . . .

Of the seven who were employed and living in communities, one (Case 21), a male, was still a ward of an institution for the mentally retarded but out on a vocational-training assignment that eventuated in his discharge from the institution. . . .

Comparisons of occupational status . . . .

The percentage distribution of family heads by socio-economic status in the north central region of the United States, 1960, were compared with the distribution of family heads of the experimental and contrast groups. It is apparent that, for the contrast group, again with the consistent exception of Case 19, the subjects are concentrated in the two lowest socio-economic status classifications. The experimental group, however, approximates the distribution of the total population.

Other comparisons of income can be made with census data for employed males in the same general area. Based on principal wage earner, the total experimental group was within the average range of income for employed males in Iowa with earnings of $4,224 as compared to $4,182–$4,782 for men in the labor force; the contrast group, however, had a median annual income of $1,200. If the two unmarried women, with annual incomes of $1,416 and $1,820 are excluded, the median wage for males in the experimental group is $4,800. . . .

EDUCATION Marked differences were found between the two groups in educational attainment. Mean and median school grades completed by experimental-group subjects and their spouses and by the contrast-group subjects are shown in Table 2.

Excluding the two cases not placed in adoptive homes (Cases 2 and 9), the mean grade completed for the experi-

TABLE 2
EXPERIMENTAL AND CONTRAST GROUPS: EDUCATION OF SUBJECTS AND SPOUSES

	EXPERIMENTAL GROUP	SPOUSES	CONTRAST GROUP	
(N = 13)	*Grade completed*	*Grade completed*	(N = 12)	*Grade completed*
Mean	11.68	11.60	. . .	3.95
Median	12.00	12.00	. . .	2.75

mental group was 12.8 and the median, 12. One subject—a male—(Case 11) had a B.A. degree from a state university and had completed some graduate work; another—a male—(Case 10) graduated from a business college; and three of the girls (Cases 3, 4, and 13) had from one semester to 2⅔ years of college education. . . .

The educational levels of the subjects in the contrast group were much lower than those of the experimental group. Using the *t* test, the difference between the means of the experimental and contrast groups was statistically significant at the .001 level. . . .

Marital and family status

EXPERIMENTAL GROUP Eleven of the 13 subjects in the experimental group had married, and one of the 11 had been divorced. The spouses came from the same type of middle-class working-class families as the adoptive homes of the experimental subjects, which is indicated by the comparable level of education in each pair and was corroborated during the interviews with parents and subjects.

As far as could be observed in the interviews, the marriages gave every indication of stability and permanence. The one divorce was secured by the husband of an experimental subject who alleged that his wife had been unfaithful and neglected the children. Custody of the five children was awarded to him. His wife had spent some time in a facility for delinquent girls during her adolescence.

Nine of the families had children of their own. Making up this second generation at the time of the study were 28 children ranging in age from 1 to 10⅓ years; 18 were boys and 10, girls.

Arrangements were made for individual intelligence tests to be given these children (Schenke & Skeels, 1965). The Stanford-Binet, form L-M, was given to 22 children, the Stanford-Binet, form L, to one, and the Wechsler Intelligence Scale for Children to 2. The Cattell Infant Intelligence Scale was administered to the three children under 2 years of age.

The 28 children had a mean IQ of 103.9 and a median of 104. The range of IQ's was from 86 to 125, and no child tested below the dull-normal level. Only about half of the children had reached school age, but among those who had, grade achievement was commensurate with age. . . .

CONTRAST GROUP In the contrast group, only two men of the 11 living subjects had married, Cases 22 and 19. Case 22 had one child, a boy, and subsequently was divorced. He was living in a modest apartment some distance from his family. The boy was examined in the home of his mother at the age of 6 years, 8 months, on the Stanford-Binet, form L-M. An estimated IQ of 66 was obtained. . . .

Case 19 is the subject that consistently was the exception within the contrast group. He was married, had four children, and maintained a comfortable home in a very attractive middle-class residential area. His four children were physically well developed, of average size for age, and were very attractive and nicely adjusted. The oldest child, a boy 5 years, 11 months of age, was doing satisfactory work in the first grade and had an IQ of 107 on the Stanford-Binet, form L. The three younger children were girls; when tested the 4-year-old had an IQ of 117 and the 2-year-old, 119, on form L, and the 9-month-old infant had an IQ of 103 on the Cattell Infant Test.

IMPLICATIONS

At the beginning of the study, the 11 children in the experimental group evidenced marked mental retardation. The developmental trend was reversed through planned intervention during the experimental period. The program of nurturance and cognitive stimulation was followed by placement in adoptive homes that provided love and affection and normal life experiences. The normal, average intellectual level attained by the subjects in early or middle childhood was maintained into adulthood. . . .

It seems obvious that under present-day conditions there are still countless infants born with sound biological constitutions and potentialities for development well within the normal range who will become mentally retarded and noncontributing members of society unless appropriate intervention occurs. It is suggested by the findings of this study and others published in the past 20 years that sufficient knowledge is available to design programs of intervention to counteract the devastating effects of poverty, sociocultural deprivation, and maternal deprivation.

Since the study was a pioneering and descriptive one involving only a small number of cases, it would be presumptuous to attempt to identify the specific influences that produced the changes observed. However, the contrasting outcome between children who experienced enriched environmental opportunities and close emotional relationships with affectionate adults, on the one hand, and those children who were in deprived, indifferent, and unresponsive environments, on the other, leaves little doubt that the area is a fruitful one for further study.

It has become increasingly evident that the prediction of later intelligence cannot be based on the child's first observed developmental status. Account must be taken of his experiences between test and retest. Hunt (1964, p. 212) has succinctly stated that,

> . . . In fact, trying to predict what the IQ of an individual child will be at age 18 from a D.Q. obtained during his first or second year is much like trying to predict how fast a feather might fall in a hurricane. The law of falling bodies holds only under the specified and controlled conditions of a vacuum. Similarly, any laws concerning the rate of intellectual growth must take into account the series of environmental encounters which constitute the conditions of that growth.

The divergence in mental-growth patterns between children in the experimental and contrast groups is a striking illustration of this concept.

The planning of future studies should recognize that the child interacts with his environment and does not merely passively absorb its impact. More precise and significant information of the constitutional, emotional, and response-style characteristics of the child is needed so that those environmental experiences that are most pertinent to his needs can be identified and offered in optimum sequence.

What influence, in fact, have the Skeels study and similar investigations had? They contributed forcefully to the reconceptualization of intelligence as being shaped by an *interaction* of genetic and environmental factors. Today the dominant view is that some upper limit is set by the genes but that life experiences are powerful forces that can foster or retard mental growth. This thesis has been argued effectively by J. McV. Hunt (1961), who drew together a wealth of evidence from laboratory findings. Like Skeels, Hunt has emphasized that a central task of society is to manage children's experiences so that intellectual development is optimized. It is first necessary, of course, to acquire information about the specific kinds of experiences that influence intelligence.

SOME CORRELATES OF INTELLIGENCE

A broad understanding of intelligence is provided by examining the factors to which it is related. Most of the studies of the correlates of intelligence are indeed correlational, and, as such, they allow only limited causal inferences to be drawn from them (see Chapter 2). Nevertheless, they have furnished many hypotheses for further exploration.

FAMILY VARIABLES

Although family variables are presumably related to children's intelligence, it is difficult to draw conclusions from existing knowledge. Examinations of family size have usually shown either no relationship to IQ or that IQ in children decreases as family size increases (McCall and Johnson, 1972). Inconsistent results have also come from investigations relating IQ to birth order in the family. For example, Burton (1968) reported a decrease in IQ with birth order in a college population, with the difference between firstborns and lastborns being 3.3 points. McCall and Johnson (1972), on the other hand, found virtually no relationship with birth order in elementary school children. Such divergent results are particularly difficult to interpret because family size is related to social class, and birth order is related to family size—factors not considered in all the investigations.

The results of a well-controlled study conducted in the Netherlands are noteworthy, however (Belmont and Marolla, 1973). The investigators examined the relationship between intellectual competence and family size and birth order for almost four hundred thousand men. They found that as scores on a nonverbal measure of intelligence decreased, family size and birth order became progressively larger. As Figure 8-5 shows, firstborns always scored higher than did secondborns, secondborns scored higher than thirdborns, and so on, regardless of family size. Furthermore, these effects were found for the three social classes examined. The authors suggest that perhaps mothers become "less effective producers" with an increasing number of children, or that parents pay less attention to the child as family size increases.

The relationship between intelligence and the specific ways in which parents deal with their offspring has also been examined. It is not easy to categorize and measure parent-child interaction, and the number of parental behaviors and attitudes affecting children's performance is presumably very large. The following remarks, then, provide only a sample of the kinds of variables being studied and some of what is tentatively known about them.

Honzik (1967) related family variables measured when infants were twenty-one months old to test performances obtained between the ages

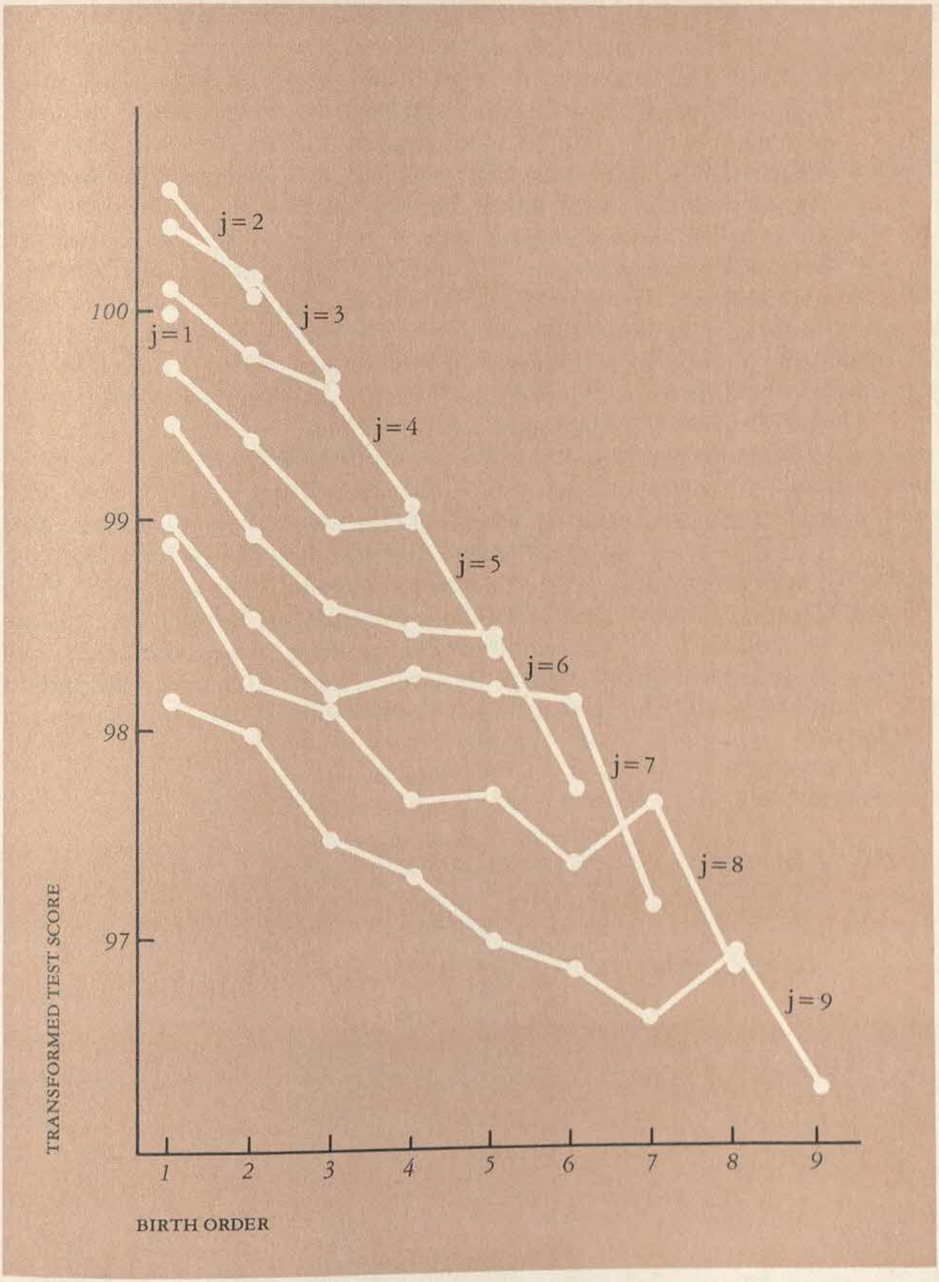


FIGURE 8–5
Scores on a nonverbal measure of intelligence according to birth order in families of different size (*j* equals the size of the families). From Zajonc, R. B., and Markus, G. B., Birth order and intellectual development. *Psychological Review*, 1975, **82**, 74–88. Copyright by the American Psychological Association, reproduced by permission.

of twenty-one months and thirty years. One of the clearer findings was the positive relation between IQ scores, particularly for boys, and mothers' worrisomeness, tenseness, concern, and energy. The author suggested that such mothers probably are more responsive to the wants and needs of their children and do more for them. The closeness of the relationship also was important. For girls, early closeness to mother was related positively to test scores, but this was superseded during adolescence by the father-daughter relationship. Girls' IQs, unlike those of boys, also appeared related to parental harmony or lack of conflict.

Interesting differences relating to the sex of the child have been found in other longitudinal studies. Bayley and Schaefer (1964), for example, reported that hostility in mothers was related to high IQ scores in boys during infancy; for girls, loving, controlling maternal behavior was related to high IQ scores during infancy.

Evidence regarding the influence of methods of discipline on intelligence is ambiguous. Baldwin, Kalhorn, and Breese (1945) concluded that children of high intelligence came from democratic accepting homes, whereas those exhibiting low performance tended to come from homes categorized as rejecting and autocratic. Kent and Davis (1957) classified parents into demanding, overanxious, normal, and unconcerned and found that children of demanding families did better than those from normal families, while youngsters of unconcerned parents did less well. This finding appears consistent with the Honzik result in

TABLE 8–4
MEAN IQ SCORES FOR THE NORMATIVE SAMPLE ON THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN CATEGORIZED ON THE BASIS OF FATHER'S OCCUPATION

	MEAN IQ		
OCCUPATIONAL CATEGORY	*Verbal*	*Performance*	*Full Scale*
Professional and semiprofessional workers	110.9	107.8	110.3
Proprietors, managers, and officials	105.9	105.3	106.2
Clerical, sales, and kindred workers	105.2	104.3	105.2
Craftsmen, foremen, and kindred workers	100.8	101.6	101.3
Operatives and kindred workers	98.9	99.5	99.1
Domestic, protective, and other service workers	97.6	96.9	97.0
Farmers and farm managers	96.8	98.6	97.4
Farm laborers and foremen, laborers	94.6	93.9	94.2

Source: Adapted from Seashore, Wesman, and Doppelt, 1950.

relating concerned, stimulating, and tense parents to high intelligence in their children. Similarly, Sontag, Baker, and Nelson (1958) found that parents of children whose IQ increased over time (see p. 217) tended to bring pressure for performance.

SOCIOECONOMIC STATUS, RACE, AND ETHNICITY

In an early study, Sherman and Key (1932) tested children from several hollows in the Blue Ridge Mountains approximately one hundred miles from Washington, D.C. Life in this cultural setting was characterized by an extreme degree of poverty, low literacy, poor educational facilities, and isolation from other communities (Figure 8–6). Not surprisingly, then, the children achieved less than average scores, and performance was related to the cultural level of the individual hollows.

The results of many investigations show a clear-cut positive relationship between socioeconomic status (SES) and IQ. The procedure employed in this research consists of categorizing families on the basis of parental education, occupation, income, social standing, or a combination of these factors, and then examining the IQ scores of children who fall into different categories.

Standardization of both the Stanford-Binet and the Wechsler Intelligence Scale for Children indicates that children from high-status families achieve the higher IQs. For example, children whose fathers are classified as professionals obtain an average Stanford-Binet score of 115, whereas children whose fathers hold slightly skilled occupations obtain an average score of 97 (McNemar, 1942). Table 8-4 indicates a similar relation for the WISC. It has been estimated that, in general, a fifteen- to twenty-five-point difference exists between scores of children of professionals and laborers (Eells, 1953).

Bayley and Schaefer (1964), among others, found that starting at about two years of age, measures of SES correlated more and more positively with IQ. Before that age, there was either no relationship or a

FIGURE 8–6
A family from one of the isolated hollows studied by Sherman and Key. From M. Sherman and C. B. Key, The intelligence of isolated mountain children, *Child Development* 3 (1932), 279–290. Copyright 1932 by the Society for Research in Child Development, Inc. Reproduced by permission.

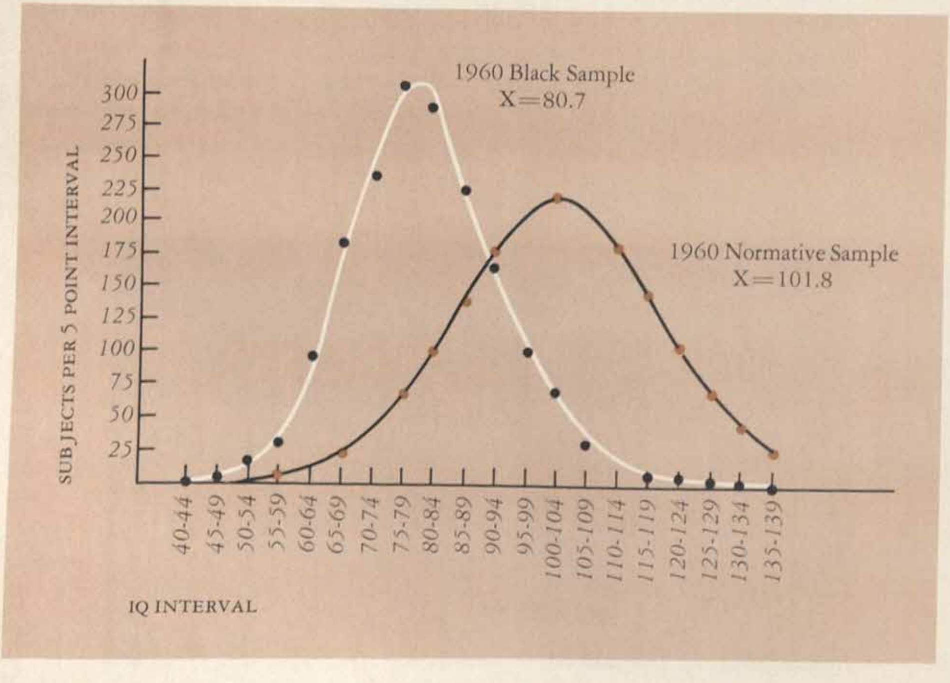
negative one. This is not surprising in light of the apparent qualitative differences of infant tests. But the question remains as to how to interpret the growing correlations with age. It could reflect either the accumulative influence of the environment or the late appearance of genetically based abilities.

The great majority of studies of racial and ethnic correlates of intelligence focus on the comparison of test scores between black and white children. Because they speak to the possibility of genetic differences between racial groups, they have been hotly debated for some time.

It is by now firmly established that blacks do considerably less well on standard IQ tests than whites (Dreger and Miller, 1960; Kennedy, 1969; Shuey, 1966). The difference is in the range of fifteen to twenty points; that is, blacks score about 80–85 compared with the white average of 100. Furthermore, the difference shows up relatively early in the lives of blacks—during preschool years—although not before; black infants do as well as whites on the kinds of skills required by infant tests. This is particularly interesting because of the well-established higher incidence of prematurity and inadequate medical and dietary care in the black population.

One of the reasons frequently cited for the black child's poor performance is that most IQ tests are standardized on white populations only. The black child is thus not represented in the normative sample with which he or she is compared. Examiners frequently make attempts to

FIGURE 8-7
IQ distribution on the Stanford-Binet for the normative white sample and 1,800 black elementary-school children in the Southeast. Adapted from W. A. Kennedy, V. van de Riet, and J. C. White, Jr., 1963. Copyright 1963 by the Society for Research in Child Development, Inc., Reproduced by permission.



compare the black child with other black children. A score in the mid-80s usually is considered an average performance, while it is inferred from a score of 100 that the child is superior. One group of investigators (Kennedy, van de Riet, and White, 1963) established norms for eighteen hundred black children of grades one to six in the southeastern United States. The mean IQ on the Stanford-Binet was 80.7. Children from metropolitan schools performed better than those from urban and rural communities. Figure 8–7 shows the distribution of the scores of black children, compared with the distribution of the original standardization sample for this test. Note that there is considerable overlap between the two distributions; this means that a large percentage of black and white children score within the same range.

It has been suggested that useful information can be gleaned about the achievement of various racial, ethnic, or social groups by an analysis of performance on different kinds of tasks (Dreger and Miller, 1960; Lesser, 1973; Lesser, Fifer, and Clark, 1965). In one such analysis, first-grade children from middle- and lower-class families from Chinese, Jewish, black, and Puerto Rican cultural groups were studied (Lesser, Fifer, and Clark, 1965). They were administered scales that measured verbal ability, reasoning, number facility, and space conceptualization. Although middle-class children obtained higher scores on all the scales, the pattern of performance within ethnic groups differed. For example, Jewish children performed the highest on the verbal tasks; then, in order of decreasing strength, on number, with space and reasoning almost the same. The pattern for Puerto Rican children was space, number, reasoning, verbal.

Jensen (1969) has proposed that the relationship between intelligence and SES can best be understood if intelligence is conceptualized into Level I (associative learning) and Level II (conceptualization) abilities. He maintains that Level I tasks are performed equally well by lower- and middle-class children but that the latter are superior on Level II tasks. His work has created a storm of controversy because he favors a genetic hypothesis in explaining this differential performance.

Many studies confound the effects of race and socioeconomic status. Because a disproportionate number of blacks fall into the lower social classes, it might be expected that such variables as poverty and little education rather than characteristics unique to the black population are of crucial importance. When attempts have been made to equalize the effects of SES, blacks still usually obtain lower scores than whites. Nevertheless, it is widely argued that gross equating on measures such as occupation or income is not done very well and that it is impossible to equate more subtle but less understood factors, such as motivation. These factors may have their bases in the differential socialization experiences of the white and black child and may account for many of the differences in test performance between individuals of different races or cultural groups. (See Chapter 4.)

EXTENDED DISCUSSION
CULTURAL BIAS AND TESTING

Psychological testing has come under increasing criticism since the 1950s. One of the criticisms is a response to the consistent finding that individuals coming from cultural backgrounds other than the broad middle or upper class perform less well on tests of intelligence than those from the general population. It is asserted that conclusions about the intelligence of various minority groups are based on tests that, by the nature of their construction and administration, are biased against them.

This stance is frequently referred to as the "Chicago point of view," because much relevant writing and research was carried out at the University of Chicago. Consider the following informal description of cultural bias as it was suggested by one of the Chicago group, Kenneth Eells:

> Let us suppose for a moment that you have a friend in Australia and that you have gone to visit him in his home country. He has told you that he is to take an intelligence test that afternoon and suggests that you take it too, just for the fun of it. . . . When you first open the test booklet you say to yourself, "Well, I'm in a foreign country, but since they speak English, I shouldn't have any special difficulty with this." But soon you are in trouble. . . . You realize that because of the mutton and the kangaroo, the strange words, the local information, and the variations in word connotations your friend had an advantage over you. If he thinks this is a good measure of your intelligence you are glad that he cannot compare your score with his. . . . As a measure of your ability to get along in a certain portion of the Australian culture the test might be excellent and you might willingly accept your low score as an accurate reflection of your "current ability." It is the labelling of the test as an "intelligence" test, with its accompanying implication that this is somehow a measure of some basic ability or potentiality of yours, that disturbs you. . . . You wouldn't object to being told you couldn't understand Australian newspapers very well; but to be told you're not very "intelligent" implies something more serious, doesn't it? [1953, pp. 284–285]

Eells goes on to note that children reared on the "wrong side of the tracks" in America are in an analogous situation. They are judged on the basis of test items requiring cultural experiences different from their own. Consider, for example, a test item such as:

A symphony is to a composer as a book is to what?

paper author musician man

It would surprise no one if children from the upper classes chose the correct answer, simply on the basis of experience, more often than those from the lower classes. And yet, this outcome is frequently interpreted as implying a deficiency in the lower classes in some inherent capability called intelligence.

There is no doubt that cultural background plays a part in test performance. It has long been noted that the lower test scores for children from rural or isolated towns might be due to their unfamiliarity with the material. Similarly, four-year-old lower-class black children from a large city have difficulty with words related to rural living (John and Goldstein, 1964). Vocabulary on tests—whether easy or difficult—is chosen from middle-class language. Even more subtle cultural differences exist when problem solving is considered. One test item, for example, asks what the child would do if he were sent to buy bread and the grocer had no more. The only acceptable answer is that he would go to another store. But Kagan (1972) notes that many black children living in an eastern city reply that they would go home—a reasonable answer if only one neighborhood store exists, but scored as incorrect nonetheless.

In one major study, in which eight group intelligence tests were administered in the Midwest, an analysis of test items for higher and lower socioeconomic classes was made

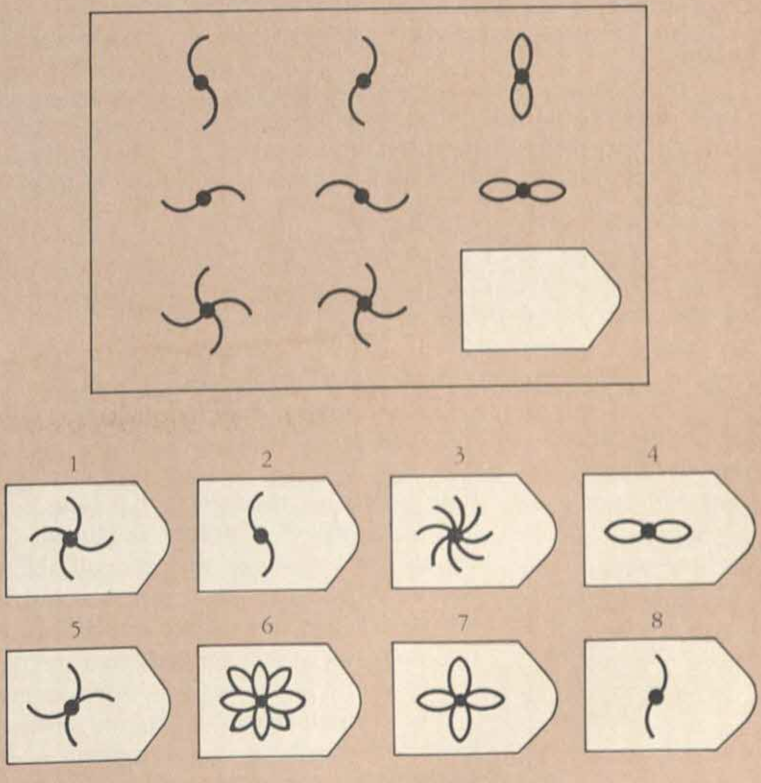
(Eells, Davis, Havighurst, *et al.*, 1951). Many items were answered differently by children of different social status; for subjects thirteen or fourteen years old this difference was as high as 85 percent of the items. The largest difference was obtained on verbal items; there was small difference on items communicated in simple vocabulary or those that were common to the social classes.

The Chicago group has argued for the use and construction of tests that eliminate aspects along which subcultures might vary. Obviously one of these aspects is the content of the items. Others are the use of language and the influence of speed (Anastasi, 1968). Several of these so-called culture-fair tests exist, including one constructed by the Chicago investigators themselves.

The Davis-Eells Games is based on the item analysis of the previously described midwestern study. It consists of sets of pictures depicting problem-solving situations which focus on concrete, everyday situations presumably common to all social classes. Nevertheless, it has been found that lower-class children also do poorly on it compared with upper-class subjects and that, furthermore, it does not predict academic success.

Other culture-fair tests, though, are relatively good predictors of academic success. Raven's Progressive matrices, for example, consist of sixty designs, each having a missing section (Figure 8-7). Examinees are required to select the missing part from several alternatives; they must abstract relationships which become increasingly more difficult. There is no time limit and instructions are simple. The Goodenough-Harris Drawing Test requires subjects merely to draw a picture of a man, woman, and themselves. It has reasonably good reliability

FIGURE 8-8
Materials similar to those used in Raven's Progressive Matrices Test.



and correlates with other intelligence tests. It should be noted, however, that both of these tests are more culture-laden than originally expected. Raven's Progressive Matrices reflect amount of education (Anastasi, 1968), while the Goodenough-Harris Drawing Test is related to the degree to which representational art exists in cultures (Dennis, 1966). A recent study of the Drawing Test, for example, showed that aboriginal Australian boys, but not girls, actually outperform the average U.S. child (Money and Nurcombe, 1974). The aborigines have a strong cultural heritage focusing on the painting of totemic designs, with which boys, much more than girls, are involved.

For the most part, culture-fair tests have not met the expectations of their proponents, either because they did not eliminate cultural differences or because they did not predict academic performance. It has been noted that "the search for a culture-free test, whether of intelligence, artistic ability, personal-social characteristics, or any other measurable trait is illusory . . ." (Goodenough and Harris, 1950, p. 399).

This is not to say, however, that the issue has not served the worthwhile purpose of emphasizing that differences in IQ scores among various subcultures are at least partly attributable to different experiences and not necessarily to basic abilities. There is little doubt that some injustice has resulted from poor judgment about test results. For example, it was disclosed that in California pupils with Spanish surnames constituted 28.34 percent of the educable mental retarded enrollment but only 15.22 percent of the general school population. Black children were 25.5 percent of these special classes while only 8.85 percent of the general population (Leary, 1970). Partially as a result of court order, the state is now using nonverbal tests employing the primary language used in the home and a study of the home environment—procedures that were not originally employed—to reevaluate pupils labeled retarded.

At the same time, it cannot be denied that standardized intelligence tests are reasonably good predictors of academic performance. Poor performance of children being reared in subcultures reflects their handicap in competing in schools or occupations defined largely by the middle class. With this in mind, one researcher has stated, "I wish we could get it *out* of people's heads that tests are unfair to the underprivileged and get it into their heads that it is the hard facts of social circumstance and inadequate education that are unfair to them" (Dyer, 1972, p. 293).

SUMMARY

The nature of intelligence has long been debated. Two major issues are involved: (1) whether intelligence is learned or innate and (2) whether it consists of one general ability or several different abilities. Some psychologists, however, view intelligence less as a capacity of the individual than as a sample of behavior that is related to other intellectual tasks, such as school performance. Within this framework, IQ scores can be useful in predicting academic success.

The construction of an IQ test involves the choosing of appropriate items, standardizing of test performance and procedures, and checking for reliability and validity. *Reliability* refers to the consistency of the test.

Validity refers to whether the test is actually measuring what it was designed to measure.

Intelligence tests vary in many ways. Group tests are efficient to give but preclude the sensitive evaluation of the child that is possible in individual tests. The first individual test, the Binet, was constructed by Binet and Simon at the beginning of this century to identify French schoolchildren who were likely to need special education. The three Wechsler tests, like the Binet tests, are widely used to evaluate children and adults. All of these tests present a variety of tasks and evaluate performance by comparing it in some way with the performance of age-mates. The Wechsler tests, unlike the Binet, produce a verbal, performance, and full-scale IQ.

Infant tests differ from others most dramatically in their lack of verbal tasks. Performance of infant tests does not correlate with that of tests given at a later time. That is, they do not predict how the child will perform intellectually in later years. They are useful, however, in helping to diagnose infants for placement into adoptive homes and the like. In general, the correlation between test scores increases as the time interval between the tests decreases.

Intelligence has frequently been viewed as being innate and fixed over time. We now know that although there is a degree of stability in test scores, there also is much individual change over time. People may fluctuate 30–40 points during their childhood. Some of this fluctuation is undoubtedly due to the influence of the environment, as earlier studies, such as the Skeels study, suggested. Thus, intelligence is now viewed as resulting from an interaction of innate and environmental influences.

In an attempt to better understand intelligence, many correlational investigations have been conducted. Despite conflicting reports, it is likely that intelligence test performance decreases progressively with family size and birth order. The relationship between IQ and parental practice is more difficult to ascertain. At the same time, socioeconomic status and IQ are correlated positively, partly because intelligence tests are culture bound and are therefore biased against children who are reared in an environment other than that of the middle or upper class.

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Language

CHAPTER 9

OUTLINE

- THE ROOTS AND SOUNDS OF LANGUAGE
    - Biological Factors
    - Preverbal Behavior
    - Phoneme Production
    - Environmental and Maturational Factors in Early Speech
- LANGUAGE COMPETENCE
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- SUMMARY

A child's first speech is one of the most momentous events in human development. Being able to communicate with others in words opens up a storehouse of new information and opportunities. We speak to one another at school, at home, and in business. Through written language we are able to preserve our ideas and benefit from the accomplishments and understanding developed by preceding generations as well. Successful and appropriate language use is also linked closely to mastery of social situations, so the inability to understand and communicate with others can hamper a person's ability to cope with even the simplest problems. And, as we have seen in earlier chapters, the processes through which language is acquired and modified necessarily involve aspects of intelligence, learning, and cognitive development—as well as being heavily influenced by biological factors.

How is language acquired? Although the question has intrigued philosophers, parents, and scientists for thousand of years, we shall see in this chapter that answers to it have not come easily and many important theoretical disputes are still unsettled. Our discussion begins with a basic description of the course of language development from the individual's earliest babbling in the crib to the comprehension and production of highly complex sentences in adulthood. We then focus on the separate aspects of language, including the issues of how meaning is attached to words and the processes through which words are arranged into grammatical and understandable sentences. And, finally, we examine language as it is actually used by children and adults in social contexts.

THE ROOTS AND SOUNDS OF LANGUAGE

BIOLOGICAL FACTORS

There is little doubt that human language development is made possible, at least in part, by biological characteristics. Human beings are unique among all of the species in possessing a highly developed system of communication. Although many other animals do exchange information in some systematic way, including birds' songs and the dance of the bee to signal the presence of food to other members of the hive (McNeill, 1970a), these communications are limited and virtually unmodifiable.

Efforts to teach apes to talk have met with relatively little success (Kellogg and Kellogg, 1933; Hayes, 1951), although one team has succeeded in teaching a chimpanzee a vocabulary of about thirty words using deaf-mute signs rather than actual speech (Gardner and Gardner, 1969), and another researcher, using plastic chips as words, has successfully taught rudimentary grammar (Premack, 1970). But members of the human species remain alone as true speakers, probably because of an unusual control of the vocal tract (the apparatus itself is present in the ape) and an innate capacity to handle complex symbols.

PREVERBAL BEHAVIOR

Children normally do not begin to speak meaningfully until after the first year of life, but "real" speech is preceded by less communicative vocalization. Sanger (1955) traced the development of prelinguistic behavior in infants at successive ages and found that infants responded to the sound of the human voice before the age of two months. Soon after (age two to four months), they also stopped vocalizing to listen to adults, although most did not show appropriate, comprehending responses to verbal cues before eight to ten months. Conversational babbling, stimulated by parents, occurred as early as two to four months of age, reaching a peak at eight to ten months. Vocalizing when alone also started at two to four months, but peaked in frequency at six to eight months. After the peak, infants apparently learned to call for adult attention. As they began to talk less to themselves, language became more functional—and more social.

The content of children's vocalization also shifts rapidly. For the first two or three months of life cries and grunts predominate; then, at about three months, cooing begins. These early sounds have been studied with a sophisticated device called the sound spectrograph, which provides a visual record of the physical aspects and the acoustic qualities of sound. Spectrograms show crying to be little more than the blowing of air along the vocal tract. With the exception of the opening and closing of the mouth, there is little articulation. Cooing produces a sound spectrogram that is quite different. The coo lasts about one-half second in duration—much shorter than the cry—and the articulatory organs, mainly the tongue, move during cooing. Infant cooing sometimes sounds "vowel-like" but differs from adult vowel production functionally and acoustically. The difference between the sound production of an adult speaker and that of a prelanguage child is illustrated in Figure 9-1. Note that even when the mother tries to imitate her own child, she makes very different sounds than does the infant. Despite these enormous differences in the physical sound characteristics of adults and infants, a one-month-old can discriminate subtle differences that are meaningful in adult speech, such as "pa" and "ba" (Eimas, Siqueland, Jusczyk, and Vigorito, 1971). This impressive finding has been interpreted to suggest that at least some receptive language abilities are innate.

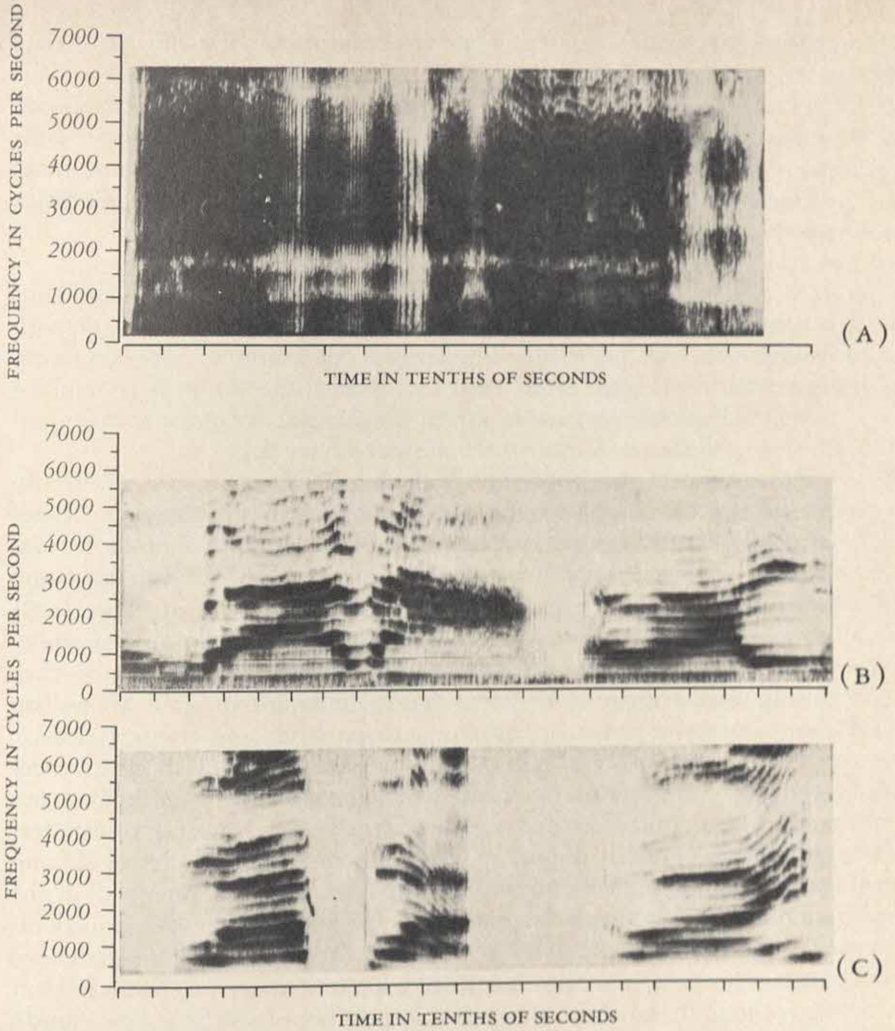


FIGURE 9–1
Some sample spectrograms of infant and mother's speech. (a) Spectrogram of a 2-week-old boy crying vigorously; (b) a 3-month-old boy cooing; (c) mother imitating her child after listening to a tape on which the baby's noises are recorded. From E. H. Lenneberg, Biological Foundations of Language. Copyright 1967. Reproduced by permission of John Wiley & Sons, Inc.

Babbling, which typically appears after cooing, involves such productions as "uggle-uggle," "erdah-erdah," "oddle-oddle," "a-bah-bah," and "bup-bup-bup" (Shirley, 1933). Some observers, noting that the vocalizations of infants suggest the rising and falling of the voice associated with questions and declarative statements in adult speech (Miller and Ervin, 1964), have argued that infants imitate the pitch, loudness, and intonation of adults in babbling (Weir, 1962). Babbling usually continues until, or even after, true language begins to appear, although for some children a short period of relative quiet precedes the onset of talking.

The cooing and babbling infant makes many more sounds than he or she will actually use in the production of later language. Some sounds drop out as one's "native language" is acquired. At the same time, though, single sounds are transformed into groups, called *phonemes*, which are the raw materials for language.

PHONEME PRODUCTION

In a general way, phonemes correspond to the usual vowel and consonant sounds of a language. But the letters alone are not quite enough to represent the phoneme. The letter *b*, for example, is pronounced somewhat differently in *bat* than in *tab*. That the sound is recognized as *b* in both words represents part of the competence of the speaker and the listener, about which we will have more to say later.

Vowel sounds begin to emerge during the first ten days of life. By one to two months of age the child commands an average of 4.5 types of vowel sounds, at thirty months he or she has control of 11.4. Inasmuch as there are only fourteen vowel sounds in the English language, the thirty-month-old child is doing quite well in terms of mastery. Of the approximately twenty-five consonants in English, infants of one to two months produce, on the average, 2.7. But by thirty months they are up to an average of 15.8 consonant sounds and so, again, are well on their way toward mastery before age three (Chen and Irwin, 1946).

The child's ability to increasingly produce more and more different language sounds, sometimes called *phonetic expansion*, roughly parallels a quite different occurrence, *phonetic contraction*. Several researchers have suggested that the infant, especially between the ages of six and twelve months, is able to, and in fact does, produce almost all of the sounds heard in human language, including the French vowels and German umlaut which are extremely difficult for English-speaking adults to master (Jespersen, 1922). As children become more proficient in their native tongue, however, they cease to produce exotic language sounds. This contraction occurs as they apparently learn to limit themselves to the sounds of their own language.

ENVIRONMENTAL AND MATURATIONAL FACTORS IN EARLY SPEECH

What factors stimulate the emergence of cooing, babbling, and other vocalizations that make up the child's first speech? As with many other developmental issues, there are nature and nurture points of view here too. According to the environmentalists, adults react differently to random sounds emitted by their infants, thereby increasing the frequency of some sounds and decreasing the frequency of others at an early age. From the hereditary viewpoint, on the other hand, it is argued that at least during the first half year, as a result of exercise and spontaneous maturation of the vocal apparatus, infants produce sounds that remain largely independent of environmental influences. The maturationalist further argues that early vocalizations may have little to do with the emergence of true language (Lenneberg, 1967), whereas environmental theorists see a clear continuity in development (Mowrer, 1960). Before a resolution of this controversy is possible, more data must be collected. However, some already existing research speaks to the issue and is of interest here.

Supporting the environmentalists' viewpoint, a series of studies conducted over a period of almost twenty years has suggested that external social reward can increase the rate at which infants vocalize (Bloom and Esposito, 1975; Rheingold, Gewirtz, and Ross, 1959; Weisberg, 1963). However, the fact that an adult's smiles and attention can stimulate infants' vocalizations does not firmly answer the question of how the child's first vocalizations emerge. We must also ask whether such environmental stimulation is essential.

Eric Lenneberg (1967), a long-time proponent of the maturational-heredity position, argues that it is not. According to Lenneberg, language competence is biologically based and follows a course closely paralleling the maturation of physical abilities (most children begin to grasp objects and grasp the meaning of their first words at about the same time, for example). The infant's first vocalizations will tend to emerge under almost any environmental circumstances—even without parental reinforcement. In one study, Lenneberg and his associates compared vocalization in infants under three months of age born to normal parents with that of infants born to parents who were both congenitally deaf. Infants of deaf parents heard far less adult speech than infants of normal parents and were by and large unable to elicit much parental reaction to their vocalizations. Yet extensive tapes showed little difference between the two groups in amount of vocalization and age of onset of both cooing and babbling. Beyond three months of age, however, more extensive exposure to speakers is required for the further development of speech and then meaningful language.

LANGUAGE COMPETENCE

The study of phonetics can play only a small part in answering the question, "How does language develop?" We must also try to discover how a child understands the meaning of communications and comes to produce and recognize messages that are grammatically correct. Technically, the study of the relationship of language to meaning is called *semantics,* and the study of the rules followed in producing "permissible constructions" is called *grammar.* The study of grammar is divided into two parts—*syntax* concerns itself with how words are combined into phrases and sentences, and *morphology* examines the formation of words themselves.

Taken together, an accomplished speaker's knowledge of the semantics and grammar of a particular language reflect his or her *linguistic competence,* the set of principles and specific information a person must have in order to be a speaker of that language. Viewed this way, the task of developmental psycholinguists is to chart the emergence of this competence from birth to adulthood and identify the underlying processes that account for it. The task is a difficult one for many reasons, not the least of which is that children's linguistic performance often does not reflect their competence at all. Here is what happened when two-year-old Adam was asked a direct question to probe his knowledge of pluralization rules:

> Interviewer: Adam, which is right, "two shoes" or "two shoe"?
> Adam: Pop goes the weasel.
>
> [Brown and Bellugi, 1964, p. 135]

The information needed by the developmental psycholinguist can be obtained, but we will see in the following pages that the search requires considerable imagination and ingenuity.

THE CHILD'S FIRST WORDS

The first word that children almost everywhere produce sounds very much like "mama," and it is believed that "mama" appears in so many diverse languages because it is derived from the natural nasal-like murmur that infants make when sucking ("mmmh-ah"). As a bit of meaningful speech, "mama" is most often used to demand that a need be filled (Jakobson, 1962). Other meaningful words do not usually appear until around the child's first birthday (McCarthy, 1954), but by the age of twenty-four months vocabulary has multiplied two-hundred to three hundred times. The number of words used continues to increase thereafter at a rapid rate (see Figure 9-2).

How, though, does the child make use of this vocabulary to construct sentences? Research has shown that the answer to this question is the same in virtually every language and culture. The child's first sentences always consist of single words. This in itself may tell us something important about the origins of language.

LINGUISTIC UNIVERSALS

The fact that a child's first sentences consist of single words has led many theorists to suggest that the concept of a sentence is part of the human organism's inborn capacity, a linguistic universal which is not itself learned but on which grammar and speech are built through learning. McNeill (1970a) has put it this way:

> The concept of a sentence may be part of man's innate mental capacity. . . . The facts of language acquisition could not be as they are unless the concept of a sentence is available to children at the start of their learning. The concept of a sentence is the main guiding principle in a child's attempt

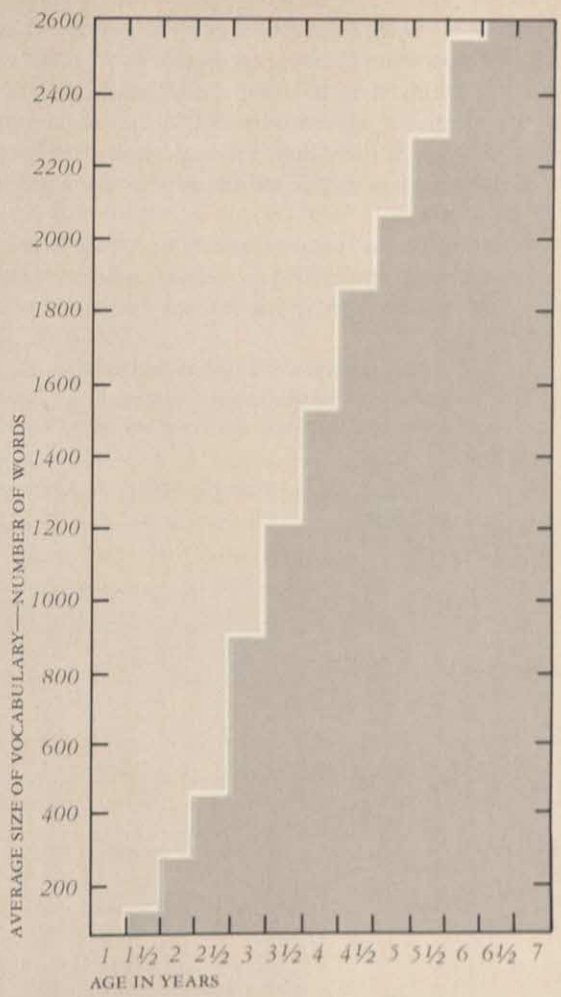


FIGURE 9-2
Size of average vocabulary of children at various ages. Data from Smith, 1926.

to organize and interpret the linguistic evidence that fluent speakers make available to him. . . .

Children everywhere begin with exactly the same initial hypothesis; sentences consist of single words. The entire structure of a sentence must be squeezed through this tiny space. This simplest hypothesis leads to the most peripheral of differences between children learning different languages. Only the words differ. A child exposed to English might use *hot* as a comment and a Japanese child would use *atusi,* but the difference is merely in sound, not in conceptual or linguistic structure. Not only are words sentences at the beginning, they are the same sentences in different languages. [p. 2]

Somewhere between eighteen and twenty months of age two-word utterances begin to appear, and their use soon expands at a very rapid rate. It is as if the child suddenly discovers the power to express an almost unlimited set of ideas and cannot resist doing so. One case study has shown that more than one thousand new and distinct two-word utterances per month appear during this phase of development (Braine, 1963).

These two-word sentences, our first evidence that the child is beginning to master syntax, may be another linguistic universal. After extensive study, one leading investigator, noted:

> If you ignore word order, and read through transcriptions of two-word utterances in the various languages we have studied, the utterances read like direct translations of one another. [Slobin, 1970, p. 177]

Table 9–1 presents some of these similarities across different languages,

TABLE 9–1
FUNCTIONS OF TWO-WORD SENTENCES IN CHILD SPEECH, WITH EXAMPLES FROM SEVERAL LANGUAGES

FUNCTION OF UTTERANCE	ENGLISH	GERMAN	RUSSIAN	FINNISH	SAMOAN
Locate, name	there book	buch da (book there)	Tasya tam (Tasya there)	tuossa Rina (there Rina)	Keith lea (Keith there)
Demand, desire	more milk	mehr milch (more milk)	yesche moloko (more milk)	anna Rina (give Rina)	mai pepe (give doll)
Indicate possession	my shoe	mein ball (my ball)	mami chashka (mama's cup)	tati auto (aunt car)	lole a'u (candy my)
Question	where ball	wo ball (where ball)	gdu papa (where papa)	missu palle (where ball)	Fea punafu (where Punafu)

Source: Adapted from Slobin (1970).

THE EMERGENCE OF GRAMMAR

If all children begin with universally patterned one- and two-word sentences, as appears to be the case, this situation is rapidly modified by environmental experience. Brown (1965) has pointed out that "by the age of thirty-six months some children are so advanced in the construction process as to produce all of the major varieties of English simple sentences up to a length of ten or eleven words" (p. 286).

This rapid change depends upon the prior development of a suitably large vocabulary. We have seen that by the age of eighteen to twenty-four months the child has mastered a vocabulary of approximately two hundred to three hundred words. By this time two-word utterances typically are found in children's speech. Extensive observations reveal that these two-word utterances are governed by rules and hence, at least from the child's point of view, are grammatical (Braine, 1963; Brown and Fraser, 1964; Miller and Ervin, 1964). Developmental psychologists must now determine the grammatical rules that the child evidently is using in order to generate sentences. We can consider a few plausible approaches.

One suggestion has been that most children begin with what is called a *pivot-open* grammar. Consider the usual two-word sentences of the young child. Sequences such as "my shoe," "a hand," and "see papa" are extremely common, whereas verbalizations such as "shoe my," "hand a," and "papa see" occur infrequently—if at all. According to the pivot-open theory of early grammar, it is supposed that the child divides his or her word repertoire into two classes and that one word from each class is selected for certain two-word utterances. The smaller of the classes is called the "pivot" class, and the other is called the "open" class. In the sequences "see papa," "see hand," and "see shoe," *see* is a "pivot" word, and all the other words fall into the "open" category.

Pivot and open words are difficult to characterize in the terms applied to adult grammar. Generally, but not always, open words are nouns. On the other hand, pivot words are often pronouns, adjectives, or articles. Pivot-open constructions usually seem to have a demonstrative quality (e.g., "see boy," "that hat") and account for about 70 percent of the verbalizations of two-year-olds. From the pivot-open construction, the child progresses to pivot-open-open and similar three-word utterances (Braine, 1963; Palermo, 1970).

Partly because some children do not seem to use pivot-open grammar at all, Bloom (1970) has suggested that young children use a grammar in which the function rather than just the position of a word plays a role. The two-word sentence *that book* serves a nominative function (it names something), whereas *mommy lunch* serves a possessive function and *Eve read* serves to link an agent and its action. Analyzing the speech of many children acquiring languages all over the world, Brown (1970) has reported that a small number of such functional relationships invariably occur in language development.

The discovery that early grammar is guided by the functional utility of language, its meaning to the speaker and the listener, shows that semantics and grammar are closely intertwined from the beginnings of speech. This fact will become even more important as we examine further how language is actually used by young children in social situations.

THE LANGUAGE OF THE YOUNG CHILD

Thus far we have described the child's early language and indicated a few of the major theoretical issues in understanding its development. Ultimately, though, one of our major interests in language stems from the fact that it is functional. In this section we shall briefly overview some of the issues involved in the use of language, noting the frequent relationship between them and the theoretical matters that have already been mentioned.

Perhaps no purpose of language is more important than its ability to function as a tool for communication. We have already mentioned the various communicative roles of one-word sentences in the very young child. It is not until a bit beyond the age of two, though, that real interchange—the beginnings of conversation—emerges.

We shall start with an excerpt (taken originally from the records of Brown and Bellugi, 1964) to provide the general feeling of what such a conversation might be like (Table 9-2). Note that certain words are missing from the child's part of the interchange. The glaring absence of most articles, auxiliary verbs, and inflections is noticeable particularly in phrases such as "put suitcase . . . for?" "Where birdie go?" "What inere?" and "Yep, it fit." But despite the deletion of many elements, including "what," "did," "you," "it," "in," and "the," from the child's sentence "Put suitcase . . . for?" the essential message can be successfully communicated. Because of the similarity between the well-trimmed telegram and these pared-down expressions, many writers have described the young child's speech as "telegraphic." This is an appealing and graphic term, but we should not overlook its deeper significance. That the child's first communicative speech sounds like telegraph messages is not important—most three-year-olds would not be able to tell you what a telegraph is. Rather, what is important is that adult telegraph messages are remarkably like children's early speech. The basic developmental principle seems to be that the essentials always come first, with refinements and frills appearing only later.

All communication includes at least two people, so we also should pay attention to the adult's part in the conversation. The passage in Table 9-2 contains several instances in which the adult rephrases or expands something the child has said, often taking something that is ungrammatical and recasting it properly. For example, the child's question "Read da?" is recast by the adult into "Will you read it to me?" and "Put suitcase . . . for?" is expanded into "What did you put it in the suitcase for?" In imitative expansion, then, the adult adds to the child's telegraphic message, making the utterance clearer as well as more grammatical. Children even seem to have a preference for being spoken to

TABLE 9–2
TYPICAL CONVERSATION BETWEEN AN ADULT
AND A YOUNG CHILD

CHILD (28 MONTHS)	ADULT
What dat . . . somebody pencil	Whose pencils are they?
Floor	Floor?
Where birdie go?	
Birdie	
Birdie up dere	
Birdie	
Read dat?	
Read dat?	Will you read it to me?
What inere?	Is that a hammer, Adam?
Hammer	
Hit hammer, mommy	
No Cromer ______, mommy?	
Hurt	Poor Adam. Did you hurt yourself? What happened, Adam?
Screw (did) happen	Screw happened? You didn't even have a screw.
have screw	
______no down there . . .	
table . . . get broom	Does that one fit?
Yep, it fit	
Yep, it fit	Does it fit?
No . . . fit	
Put suitcase . . . for?	What did you put it in the suitcase for?
What dat?	That's tape. We'll use that one tomorrow.
All right 'morrow	Shall we use it tomorrow?
Yep	
Use morrow, yep	
Sure, use morrow	

Source: R. Brown and U. Bellugi. Three processes in the child's acquisition of syntax. *Harvard Educational Review*, 34, 1964, 133–151. Copyright 1964 by the President and Fellows of Harvard College.

in adult terms. In one investigation (Shipley, Smith, and Gleitman, 1969) it was reported that young children are actually more responsive to adult commands given in adult form *(Throw me the ball)* then the same command in a form that approximates the child's own level of syntactic production *(Throw ball).*

McNeill (1970a, 1970b) has suggested that an adult will select an expanded sentence to fit the child's intended meaning, manufactured from both the child's utterance and the situation which exists. Thus, if the child's meaning is correctly guessed, the adult is actually presenting to the child a grammatically appropriate way to express the meaning the child has in mind.

MORPHOLOGY

Up to now we have been focusing on the development of syntax, but the pattern of morphological development has also been of interest to researchers because here too there is striking evidence that the child's linguistic competence involves the use of rules almost from the beginning.

Inflection, for example, is an important aspect of morphology that refers to changing the shape (and usually the meaning) of a word by the addition of suffixes (e.g., adding *-ed* to *walk* marks the past tense) or an alteration of the base itself (e.g., converting *swim* to *swam*). In a classic study, Berko (1958) demonstrated quite conclusively that children's inflection of words is rule-regulated rather than merely based on memory of specific forms for specific words. She accomplished this by presenting children with totally unfamiliar words that required inflection; thus the children had no previous exposure and could not rely on direct past experience. More specifically, Berko showed children some pictures of nonsense objects, such as the one in Figure 9–3 below, and said "This is a WUG." She then showed the child a picture of two such objects and said. "These are two——" providing an opportunity to supply the plural form of WUG. Her subjects, preschool children, were able to perform remarkably well (i.e., by application of the rule, the plural of WUG ought to be WUGS).

Patterns of rule-regulated language of the type identified by Berko, frequently can be observed even in the casual observation of young children's language. For example, children will often "regularize" what are, in fact, irregular English forms by saying "He *doed* it" instead of "He *did* it" or "I see the sheep*s*" rather than "I see the sheep." Inasmuch as it is most unlikely that they have heard adult speakers use these par-

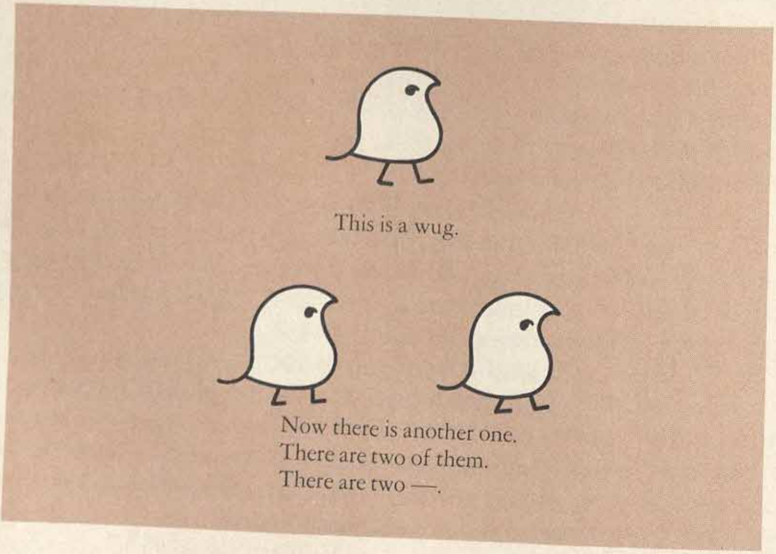

This is a wug.
Now there is another one.
There are two of them.
There are two —.

FIGURE 9–3
An example of the pictures used by Berko to show that children know and use morphological rules even by preschool age. Although the child has never heard the word WUG before, he or she will "correctly" pluralize it into WUGS. Adapted from Berko (1958).

ticular phrases, they are presumably operating with rules that they have abstracted, incorrectly in these cases, from the language they have heard.

If casual observation reveals the child's knowledge of morphological rules by charming but mistaken regularizations, it is less likely to reveal the surprising sequence of this aspect of language development. Most people would probably guess that a child's first tendency is to regularize irregular words, as in the sentences we have just examined, and that the error is rectified later by overhearing correct adult usage. In fact, this is not the sequence at all. Children usually begin by using the correct form of irregular verbs, such as *came* and *broke,* probably because they are imitating these frequently heard adult forms as particular words. Then, perhaps weeks or even months later, the child will shift from correct to incorrect usage, by regularizing all verbs. The child who begins by saying *I broke it* will "advance" to the stage of saying *I breaked it* rather than the other way around. By the time they start school, of course, most children will have permanently reinstated commonly used irregular forms as their typical language performance (Ervin, 1964).

LATER SYNTACTIC DEVELOPMENT

As the foregoing review suggests, even the youngest child who uses two-word sentences is able to produce communications that display grammatical regularities that are not merely word-for-word replicas of those heard in the speech of others. In fact, even if one hundred years were spent listening to adult sentences, with no interruptions for eating or sleeping, the time would be insufficient to hear all the sentences one is potentially able to speak or understand. How, then, does the child's remarkable ability to speak grammatically develop? One possibility is that the process is shaped by familiar principles of learning.

SKINNER'S POSITION

In the late 1950s, Skinner (1957) attempted an account of the emergence and maintenance of language, using as the basis of his speculation many of the same variables that had shaped and maintained nonverbal behavior in the laboratory through operant conditioning (see Chapter 6). His account, a complex extrapolation mainly from animal research, covered several aspects of language. Here we will illustrate only its general flavor.

One facet of Skinner's theory is the notion of partially conditioned *autoclitic frames.* When a child has acquired responses such as "the boy's gun," "the boy's shoe," and "the boy's hat," the partial frame "the boy's———" is presumably available and may be combined with other responses. Thus when the child notices a boy who has recently obtained a bicycle, he or she may compose a new unit "the boy's bicycle," by inserting the appropriate term in the previously acquired frame. The relational aspects of the situation determine the use of the particular frame, and the specific features of the situation determine the nature of the responses fitted into it. To illustrate, Whitehurst (1972) trained two-year-old children to use partially conditioned autoclitic frames as defined by Skinner. The procedure involved teaching two subjects to label individual colors or figures with a nonsense vocabulary (e.g., "Gol" or "Tib"), and then training them to label the color and figure simultaneously, in a given order. For example, when the color red and a particular figure were presented, the correct answer would be *red car* (except that the subjects' actual responses were in the nonsense vocabulary, e.g., "Gol Tib"). Then a new figure label would be taught and simultaneously presented with the old color, red. The red stimulus, then, was retained as part of each new unit and should become a frame for learning this simple grammar. This is just what happened for both children. They soon learned to produce novel but grammatically correct descriptions of any red object for which they were taught a label, without having to hear or be rewarded for producing the particular description.

That syntax *can* be learned through reinforcing only the well-formed verbalization does not necessarily mean that children *do* in fact learn solely because they are rewarded for good grammar. One reason for doubting that reinforcement plays the central role in language development that learning theorists have accorded it is an intensive study of the natural language development of three children, "Adam," "Eve," and "Sarah," from the time they were about two years old (Brown, Cazden, and Bellugi, 1969):

> Every second week we visited each child for at least two hours and made a tape recording of everything said by the child, as well as of everything said to the child. The mother was always present and most of the speech to the child is hers. Both mother and child became very accustomed to our presence and learned to continue their usual routine with us as observers. [Brown, 1965, p. 287]

One of the most striking aspects of the transcripts of these sessions is that the child learns speech imitatively, through a reciprocal process of interchange with the mother. Specifically, the child tends to show *imitation with reduction* of the mother's speech, whereas the mother imitates some of the child's phrases *but expands upon them*. Both types of imitations are illustrated in Table 9-3.

Parental expansion may at first seem like one way in which children are implicitly rewarded and encouraged to use correct grammar. On closer inspection, however, one notes that this training did not focus on improving the child's syntax, and that, as often as not, children were rewarded after producing clear grammatical errors. Brown and his associates (1967) reported of their observations:

> Once in a while an error of pronunciation was noticed and corrected. Most commonly, however, the grounds on which an utterance was approved or disapproved . . . were not strictly linguistic at all. When Eve expressed the opinion that her mother was a girl by saying "He a girl," mother answered "That's right." The child's utterance was ungrammatical but mother did not respond to the fact; instead she responded to the truth value of the proposition the child intended to express. In general the parents fit propositions to the child's utterances, however incomplete or distorted the utterances, and then approved or not, according to the correspondence between proposition and reality. Thus "Her curl my hair" was approved because mother was in fact curling Eve's hair. However, Sarah's grammatically impeccable "There's the animal farmhouse" was disapproved because the building was a lighthouse and Adam's "Walt Disney comes on, on Tuesday" was disapproved because Walt Disney comes on, on some other day. It seems, then, to be truth value rather than syntactic well-formedness that chiefly governs explicit verbal reinforcement by parents. Which renders mildly paradoxical the fact that the usual product of such a training schedule is an adult whose speech is highly grammatical but not notably truthful. [Brown, Cazden, and Bellugi, 1967, pp. 57–58]

TABLE 9–3
EXAMPLES OF IMITATION WITH REDUCTION (BY THE CHILD) AND IMITATION WITH EXPANSION (BY THE MOTHER) IN STUDY BY BROWN *ET AL.*

IMITATION WITH REDUCTION

Mother	*Child*
Daddy's brief case.	Daddy brief case.
Fraser will be unhappy.	Fraser unhappy.
He's going out.	He go out.
No, you can't write on Mr. Cromer's shoe.	Write Cromer shoe.

IMITATION WITH EXPANSION

Child	*Mother*
Baby highchair.	Baby is in the highchair.
Mommy sandwich.	Mommy'll have a sandwich.
Pick glove.	Pick the glove up.

Source: Brown, 1965.

THE ROLE OF OBSERVATIONAL LEARNING

In Chapter 6 we distinguished between *observational learning*, the psychological process through which the behavior of one person is changed by coming into contact with the behavior of others, and *direct imitation*, which is simply the act of copying someone else's words or deeds. Whether "imitation" does or does not play a significant role in language development is a hotly debated question, but much of the argument occurs because of confusion regarding the terms involved.

At one time, for example, it was thought that children learned to speak grammatically by merely listening to and then copying adult sentences in precisely the form they were heard. It has now become apparent, however, that this is not the case. Children produce many more sentences than they have ever heard. More importantly, even when children imitate adult sentences, they do not imitate adult grammar; even in simply trying to repeat *I am drawing a picture*, young children will say *I draw picture*. And, finally, children who cannot speak at all and thus never imitate language may come to comprehend it perfectly (Lenneberg, 1967).

But observational learning, in some form, must be deeply implicated in language acquisition. Children all over the world come to speak the language and use the grammar of those around them, and this is as true of children adopted from one culture to another as it is of those with "biological roots" in a particular language. Children must learn a major part of language from exposure to native speakers (an American child who cannot speak will learn to understand English from the language of others, but a child who is reared in a world where no one else can speak will obviously not understand English at all). The question is, What processes are involved in the learning? Developmental psychologists interested in observational learning have increasingly focused on children's ability to abstract the underlying rules that apparently govern a model's behavior in language and in other areas as well. Once such rules have been formulated, the observer can generate an endless number of novel responses that are consistent with them (Zimmerman and Rosenthal, 1974).

Applying this type of reasoning to the study of syntactic development, Leonard (1975) selected eighteen children between two years, four months of age and three years, four months of age, all of whom used two- and three-word utterances ("More milk," "That kitty") but none of whom were producing true subject-verb sentences ("Man read," "Boy go," "I drink"). Training, though it varied in minor ways that need not concern us here, consisted of exposure to an adult model who was rewarded for describing various pictures and situations in two-word, subject-verb sentences. When he compared children so trained with a group of control children who had received no special training, Leonard found that the modeling groups showed significant gains in their production of novel, grammatical two-word sentences. The test he used, which avoided the problem of having to give special verbal hints or instructions, was to ask children to describe pictures that invited the subject-verb form of grammatical construction, such as a picture of a man walking, simply taken out of a magazine.

TRANSFORMATIONAL GRAMMAR

There is much about children's grammar that remains unexplained by merely saying that language is learned through observation and abstracting rules. For one thing, youngsters seem able to respond correctly to aspects of language that are not marked in any obvious way in speech, such as the "logical" subject of a sentence. Consider the sentences "John is eager to please" and "John is easy to please." Although *John* may appear, at first blush, to be the subject of both sentences, it is actually the subject only in the first. The second, "John is easy to please," actually means that it is easy for someone to please John. The question is not whether people can make the distinction—it is apparent that they can—but *how* the distinction is made. One theorist, Noam Chomsky (1968), has proposed that the answer lies in the theory of transformational grammar.

Transformational grammar theory is primarily designed to provide a cognitive explanation of language processing and its development. One writer (Ehri, 1972) traces the view back to a classic analysis by the eminent neuropsychologist Karl Lashley, who suggested that a three-step sequence of mental events underlies the production of any sentence. First, some event, occurring either in the environment or within the person, arouses a thought. In turn, the thought calls forth learned expressive units—words—which represent components of the thought. Finally, as the last step, the words are arranged into a sequence appropriate to communicate the thought in a particular language. Those who accept this view claim that analysis of the end product, the particular linguistic expression of a thought, can provide only limited information about the process of language generation. It is not the particular form of an expression but its underlying meaning, or *deep structure,* that really matters.

If this view is correct, the same process should also work in reverse. That is, when in the role of listener (and learner), persons would be expected to understand communications of others by processing the grammatical surface structure of sentences they hear to extract the underlying relations and meaning. The superficial structure of the communication would then probably be forgotten, and only the deep structure would be preserved in memory. This expectation has received strong support in research. Children and adults, presented with a number of sentences with varying surface structure but the same deep structure (e.g., "The soldier destroys the bridge" or "The bridge is destroyed by the soldier"), will remember the meaning of the sentences they have heard but have great difficulty in remembering the particular structure on which it was based.

Surface and deep structure: a closer look A transformation, for Chomsky, is a relationship between the underlying or *deep* structure of a sentence and its superficial or *surface* structure. The surface structure of a sentence is the apparent relationship among its elements and has been traditionally viewed as the ordered set of phrases or "parts of speech" learned in elementary school. *Visiting relatives can be a nuisance* is readily analyzed into a noun phrase *(Visiting relatives)* and a compound verb phrase *(can be) (a nuisance)*. But underlying this surface arrangement is a twist: the sentence has two possible underlying meanings. We must transform this sentence in order to detect its message, and here we find that two quite different underlying meanings could be represented by this one-word string, depending on the deep structure we read into it. Transformed in one way the sentence means *Relatives who visit can be a nuisance,* but an equally plausible transformation of the same word string is *It can be a nuisance to visit relatives*. We understand the sentence only when we grasp its underlying structure, which cannot be equated with the initial arrangement of the word string itself.

THE EMERGENCE OF GRAMMAR IN CHILDREN'S QUESTIONS: AN EXAMPLE

Viewing syntactic development as the child's growing ability to transform the surface structure of a sentence into its underlying or deep structure has produced some new insights into the developmental process itself. For example, by age five or six most children display grammar that is virtually adult in their spontaneous speech, but their comprehension of certain surface forms still lags considerably. To see what researchers have done, let us first examine the sentence *The book is hard to understand.* The surface structure of the sentence suggests that *book* may be the subject because it is the first noun in the sentence and immediately precedes the verb. We know, however, that book is *not* the subject of the sentence. According to the underlying relationship among the elements of this sentence, its deep structure, *book* is the object of the sentence and the subject is implicit, that is, *It is difficult (for one, for me) to understand the book.* Can children correctly identify the deep structure of such sentences?

To answer this question, we must first eliminate the possibility that the sentence can be understood by young listeners from the semantic meaning of the words alone, without resorting to an analysis of syntactic structure. In our previous sentence, the needed semantic information is that books cannot understand, only living things can do that. One investigator (Carol Chomsky, 1969) devised a sentence that parallels our book example, *The doll is easy to see.*

Chomsky placed a small, blindfolded doll in front of each of her subjects and asked, "Is the doll easy to see or hard to see?" She found that children answered with considerable self-assurance, but there were a surprising number of errors even up through the age of eight (see Table 9-4). Apparently the deep structures of some sentences are not easily found and children just avoid such constructions in their spontaneous speech.

An equally interesting discovery, also made by Carol Chomsky, is that children confuse *ask* and *tell* during the early elementary school years. This is *not* because they don't know the meaning of these words

TABLE 9–4
PERCENTAGE OF CHILDREN AT VARIOUS AGES WHO RESPOND CORRECTLY TO THE DEEP STRUCTURE OF THE QUESTION "IS THE DOLL EASY TO SEE OR HARD TO SEE?"
(The younger children tend to respond as if the question were "is it easy [or hard] for the doll to see?")

AGE OF CHILD	PERCENTAGE RESPONDING APPROPRIATELY TO THE DEEP STRUCTURE
5	22
6	42
7	86
8	75
9	100

Source: Adapted from data presented in C. Chomsky (1969).

but because in certain sentences the implied underlying structure is confusing to them. The following passage, an actual dialogue between six-year-old Laura and an adult, illustrates the point.

> Q. Ask Joanne what color this book is.
> A. What color's that book?
> Q. Ask Joanne her last name.
> A. What's your last name?
> Q. Tell Joanne what color this tray is.
> A. Tan.
> Q. Ask Joanne what's in the box.
> A. What's in the box?
> Q. Ask Joanne what to feed the doll.
> A. The hot dog. [Here Laura has confused *ask* and *tell*.]
> Q. Now I want you to *ask* Joanne something. *Ask* her what to feed the doll.
> A. The piece of bread. [Laura persists in telling rather than asking Joanne.]
> Q. Ask Joanne what *you* should feed the doll.
> A. What should I feed the doll?*
>
> [C. Chomsky, 1969, p. 57, italics added]

TRANSFORMATIONAL GRAMMAR AND THE DEVELOPMENT OF SYNTAX

By taking a closer look at the development of children's questions, we can further illustrate the ideas behind transformational grammar theory and also note the remarkably orderly pattern involved.

Anyone spending even a few minutes with children will discover that they avidly and often persistently ask questions. There are, however, striking developmental differences in both the structure and the content of these questions as children mature.

---

*Laura gives the correct answer here because the experimenter's question has made it obvious that she and not Joanne must feed the doll.

Almost invariably, the child's first questions are marked by intonation alone, the simplest way of converting a declarative statement into an inquiry. Soon after a child can declare *My ball* he or she can also ask *My ball?*, and this form is probably admissible in the deep structure of almost all languages. Only later are transformations to more sophisticated surface structures likely to be seen.

Shortly after the first question is asked, advantage is taken of the "wh" words *(who, what, when, where, why)*. However, although the use of *wh* words as part of questions appears quite early, they do not at first follow adult form. The young child merely attaches the needed word of inquiry to the beginning of a sentence *(Why him go? What her eat?)*, without altering the base sentence at all. Even when the base sentence already has a negative form, the first questions are produced by simply adding *why not* and the questioning intonation while leaving the base sentence intact, as in *Why not Susie can't walk?* (Dale, 1972).

Transformational grammarians assert that all questions derive from a base or kernel string of words, usually a declarative sentence, through a series of transformations. The child "learns" the transformations, perhaps by listening to other speakers, but only because he or she is innately capable of noticing and applying them.

Let us begin with the sentence "John will do this." The simplest interrogative form that derives from the same kernel is "John will do what?" but this sentence is not the usual one produced by English speakers; rather, they say "What will John do?" How does one move from the kernel to the standard interrogative form? The answer offered involves the use of two transformations.

Preposing, a simple transformation that often characterizes the interrogative questions of young children, merely involves bringing the *wh* word to the beginning of the sentence:

1. John will do what?
2. John will do what?
3. What John will do?

Transposing, on the other hand, involves knowing that one must exchange the order of the subject and the auxiliary verb:

1. John will do what?
2. John will do what?
3. What will John do?

Transformational grammar theory, then, proposes a particular sequence in the development of the child's comprehension and production of grammatical sentences based on the emergence of rules of transformation. This theory has received increasing support from developmental psychologists over the last few years and obviously forms an important bridge between grammatical and semantic development.

SEMANTICS AND THE ACQUISITION OF MEANING

We have already defined *semantics* as "the study of the relationship of language to meaning," so it is not surprising that developmental psychologists interested in semantics have asked when and how meaning is acquired. These questions are particularly difficult, especially since *meaning* itself is a complicated concept still hotly debated by philosophers.

EARLY SEMANTIC DEVELOPMENT

The problem of understanding semantic development appears with the beginnings of vocabulary. In an earlier section we noted the rapid increase in vocabulary during the first few years of life. We will now examine this phenomenon in somewhat greater detail and also indicate some of the possible explanations offered regarding the process of semantic development.

The growth of the child's vocabulary proceeds in an orderly way that provides some important hints about the nature of semantic development. First of all, certain words appear very early in the working vocabularies of most children. The outstanding characteristic of these few words is that they refer to things that move or change by themselves or that can be readily acted on by the child. As Nelson (1974) points out:

> "Dog," "cat," "car," and "ball" are the most common "thing" words produced by young children. . . . Of the clothing items found in early vocabularies, two thirds are shoes and other footwear that the child acts on. It is furthermore noteworthy that early vocabularies do not include items that are just "there," that the child sees but does not interact with and that do not themselves move, for example, furniture. [1974, p. 279]

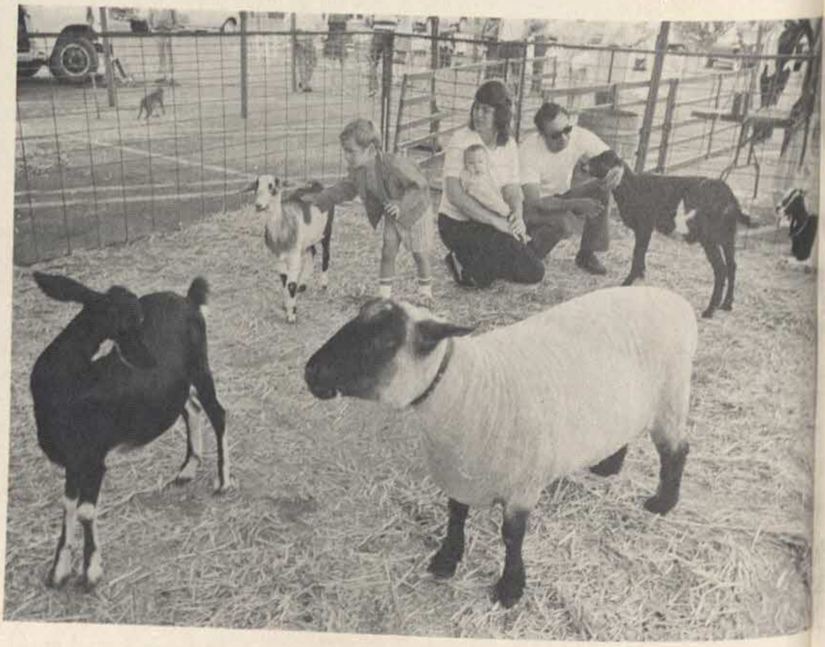
This finding suggests that semantic development may be based on the child's forming functional concepts out of his or her own experience and then identifying words that seem to fit the concept. Such a view is supported further by the finding that when young children cannot find a word to express a particular meaning, they will often invent one (Werner and Kaplan, 1964).

Obviously, however, an important part of semantic development involves learning to discern the usual or commonly understood meaning of words, and here a theory of the acquisition of meaning is required. It is generally agreed that the process involves some sort of concept formation and that the child's first efforts to tie concepts and words are somewhat imprecise. The clearest example is when the meaning of a word is "overextended" by a child, a well-documented phenomenon (Nelson, 1973) illustrated by young children's often calling all four-legged animals "dogs" or all adult males "daddy."

One plausible theory of the acquisition of meaning which explains such overextensions is the *semantic feature theory* (Clark, 1973). According to this theory, the child's first learning of word-thing relationships involves attaching only one or two features of a thing to the word that names it. Then, as a result of exposure to adult correction and usage, new and more discriminating features may be added to the child's meaning of the word until it includes all the features recognized as essential by adults. Concretely, the child at first refers to all four-

FIGURE 9–4 (Left)
Words that refer to objects that engage children actively, such as articles of clothing they must put on, are among the first to enter their vocabularies. Photo by Eileen Christelow.

FIGURE 9–5 (Below)
Young children often overgeneralize the meaning of words, for example, by calling all four-legged animals "dogs." Photo by Shumsky, Jeroboam, Inc.



legged animals as "dogs" because four-leggedness is the only feature associated with the word. Over time, however, many other features will be added (fur, paws, the ability or tendency to bark, and so on) until the child's meaning of "dog" corresponds to the usual adult meaning.

A child's understanding of the meaning of "thing" words almost certainly precedes a grasp of the more abstract connotations that adults may ascribe to words with which the child is already somewhat familiar. *Blue,* for example, is probably known to most four-year-olds as a color word (for example, in *The ball is blue*), but few preschoolers will understand its meaning as an emotional state; *I feel blue* just sounds like an anomalous or "silly" sentence to them. Unfortunately, almost nothing is known at present about how these subtleties of meaning are acquired.

LATER SEMANTIC DEVELOPMENT

In daily language, children beyond the first year or two of life are much more likely to be faced with interpreting the meaning of complete sentences rather than single words, and this may involve more than the ability to understand the individual words themselves. Indeed, we have already discussed some of the problems of determining the meaning of sentences when we considered the problem of relating the surface structure of a sentence to its deep structure (see p. 259).

One technique that has been used to trace the course of semantic development as it applies to sentences simply involves the child's immediate ability to recall word strings that vary in their meaningfulness for adult speakers. In several experiments (Miller and Isard, 1963; McNeill, 1970b) the strings, which always consist of the same number and types of words, have been either *grammatical and meaningful, grammatical and anomolous,* or *scrambled.* Here is an example:

Grammatical and meaningful: *The academic lecture attracted a limited audience.*
Grammatical and anomolous: *The academic liquid became an odorless audience.*
Scrambled: *Liquid the an became audience odorless academic.*

Differences in ability to recall these strings could be based on syntactic information (although the anomalous sentences are meaningless, they are "grammatical") or semantic information (only the first sentence has a comprehensible meaning). As shown in Figure 9-6, both processes operate. Children as young as five years recall and are able to reproduce anomalous sentences better than scrambled ones, and this accords with their already well developed syntactic ability. Semantic cues, on the other hand, though they aid recall at all ages studied, grow steadily in their importance for recall through age eight. As Dale (1972) notes, it is hard to resist the conclusion that semantic development proceeds more slowly than syntactic development.

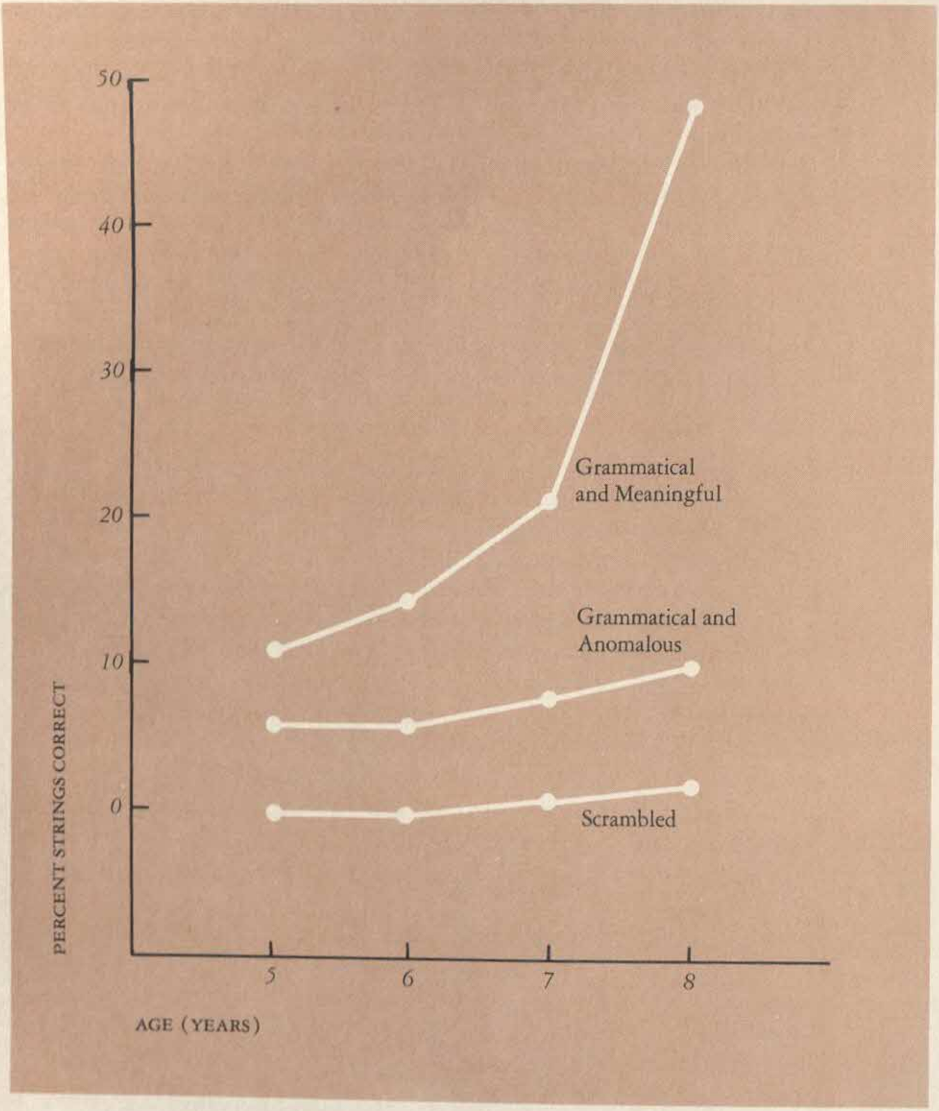


FIGURE 9-6
Percentage of grammatical and meaningful, grammatical and anomalous, and scrambled word strings correctly recalled by children five, six, seven, and eight years old in McNeill's (1970b) experiment, showing that younger children have difficulty making use of semantic information. Adapted from McNeill.

SEMANTICS AND SYNTAX

One measure of a child's understanding of the meaning of a sentence is whether he or she will respond to it appropriately. Suppose, for example, a child is presented with red and green toy trucks of the same size and is asked to place them on a table so that "The red truck *is pushing* the green truck." Ten- and eleven-year-old children will respond quite quickly—and they will be correct about 99 percent of the time. But suppose that instead the child is asked to create the situation in which "The green truck *is being pushed by* the red truck." Although the action called for is the same, the likelihood of error is higher and the child takes significantly longer to respond at all. Why is the second sentence so much more difficult to understand?

Huttenlocher and her associates (e.g., Huttenlocher, Eisenberg, and Strauss, 1968), who have performed a number of experiments to answer this question, point out that in the first sentence, "The red truck is pushing the green truck," *red truck* is both the logical and the grammatical subject of the sentence. (*Red truck* is the logical subject in the sense that it must be the source of the action and "do the pushing.") But in the second sentence *red truck,* though it continues to be the logical subject responsible for the action, becomes the grammatical *ob*ject of the sentence. In extracting the sentence's meaning, it seems that children must begin with a sort of preliminary grammatical analysis of what they have been told. Only after this analysis can they translate the information contained in the sentence, its meaning, into appropriate action. When the grammatical and logical subject are not the same, as in the second version, the translation task is much more difficult.

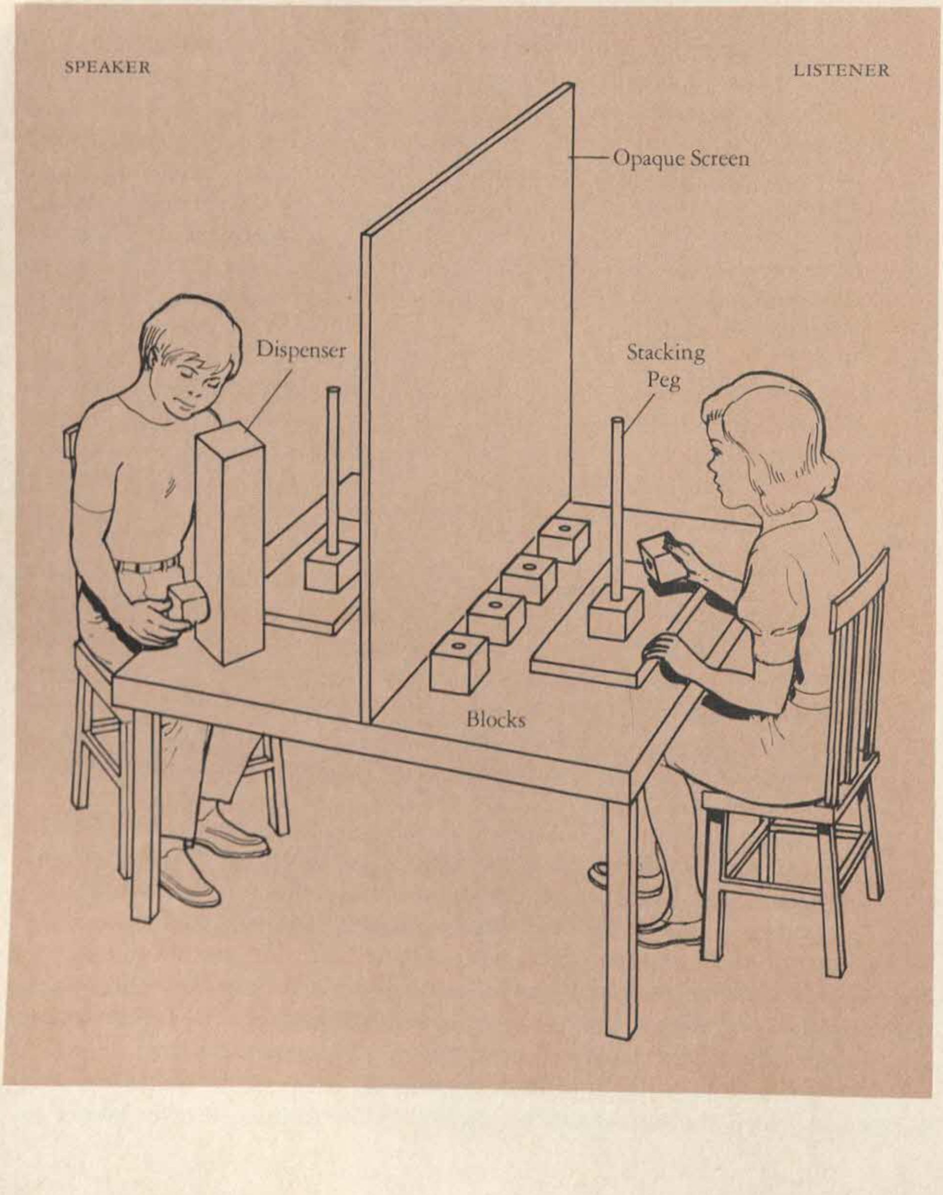
EGOCENTRISM IN CHILDREN'S LANGUAGE

By the time children reach the age of five or so, their literal face-to-face conversations are impressively like those of similar communications among adults. Most major grammatical forms have appeared, and the youngster already possesses an adequate vocabulary. But the child's language is still self-centered (that is, *egocentric*) and remarkably concrete.

Long ago, for example, Piaget (1926) asked children to teach other youngsters how to use mechanical devices, such as a syringe. Children under six years of age did very poorly at explaining, apparently unable to see the problem from the listener's point of view; they used vague gestures and pronouns such as "this," "something," "here," "there." Even when the child receiving the instruction was blindfolded, the young speakers did not appear to grasp why their communications would be unsuccessful.

More recently, Glucksberg, Krauss, and their associates (Glucksberg, Krauss, and Weisberg, 1966; Glucksberg and Krauss, 1967; Krauss and Weinheimer, 1964) also have observed communication between children. In their experimental situation children are seated out of sight of each other, as in Figure 9–7, and are asked to play a game called "stack the blocks." One child is the speaker and has the job of encoding a message to relay to another child. The second youngster, the listener, must decode the speaker's message and act on the information. In front of each player is an array of six blocks and a peg on which the blocks can be stacked. The speaker receives blocks one by one from a dispenser and must put them on the peg in the order they are received. The listener's blocks, however, appear in a random array on the table. The object of the game is to form two identical stacks of blocks. To accomplish this goal the speaker must verbally instruct the listener in a way that can be understood. Each block carries a design (see Figure 9-6) by which it can be identified. The designs, however, have been carefully chosen and are not ones that have readily available English names.

FIGURE 9–7
The experimental task used by Glucksberg, Krauss, and their associates.



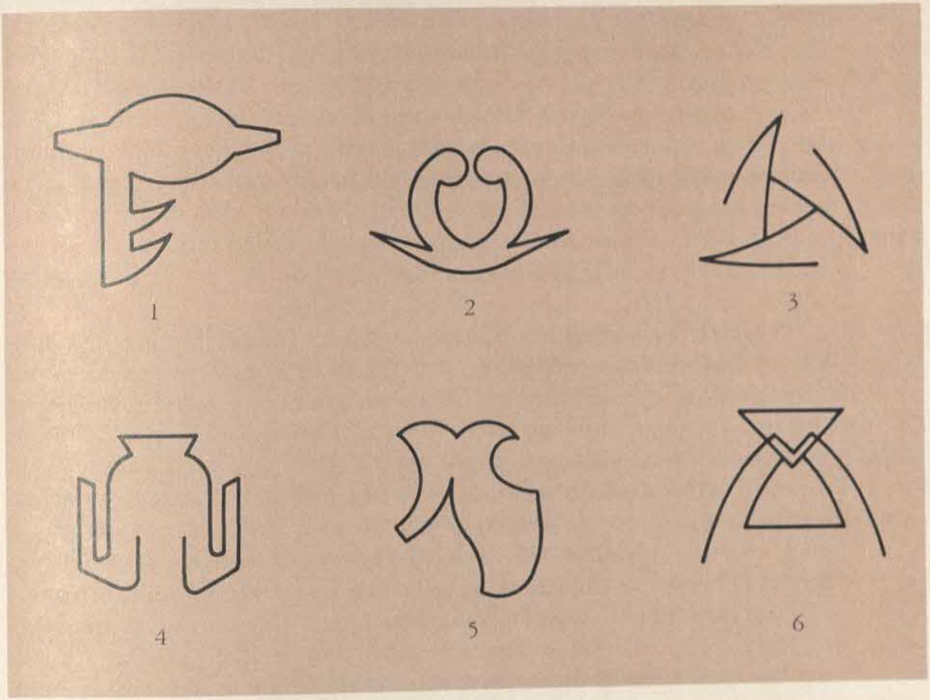


FIGURE 9-8
The six novel forms used in the Glucksberg and Krauss experiments.

In the first in a series of experiments, children of approximately four and five years of age served as subjects. Results showed that the speaker child tended to use reference phrases that were private and idiosyncratic. One youngster, for example, referred to form 5 in Figure 9-6 as "a pipe, a yellow part of a pipe," a phrase that communicates much less well than such labels as a "boot," a "horse's head," or an "ax head"—which represent average adult responses. (Incidentally, the adjective "yellow" conveyed no useful information, since the forms were stamped with black ink on natural redwood blocks.) Another young speaker referred to form 6 as "Mommy's hat." Apparently it resembled a particular hat belonging to that child's mother but, for the naive listener, the message did not contain enough information to assist performance. Adults, on the other hand, tended to refer to it as "An upside down cup. It's got two triangles, one on top of the other." It is not surprising that not one of the seven pairs of children was able to complete a single game without error.

A second experiment, however, showed that children of the same age functioned much more effectively in the listener role when they had to respond to reference phrases that had been used by adult subjects rather than by other children. Eight out of twelve met the criterion of two consecutive errorless games. Yet a third experiment was performed to determine whether children would understand their own idiosyncratic labels. Subjects of four and five years of age saw each of the six forms and were asked by the experimenter to "tell me what this looks like." The experimenter then played the role of speaker in the communication game, using the names that had been supplied by the children earlier. The results showed that the children's own names were adequate to guide their actions. One young subject referred to form 4 as "Daddy's shirt" and form 6 as "another Daddy's shirt" but, in each case, selected the correct form.

Research extending the Glucksberg and Krauss inquiry has now shown that the frequency of egocentric speech among children depends on the entire speaker-listener relationship and not just on the age of the speaker (e.g., Mueller, 1972; Hoy, 1975). Hoy, for example, found that five to nine-year-olds could reproduce toy models simply from a peer's verbal description (of either a horse or a random shape) almost perfectly (99 percent correct) if the speaker and listener could see each other in full view and engage in two-way exchanges. When a comparable sample of children had to communicate the same information without the benefit of seeing their listeners at all, accuracy plummeted to 62 percent. These differences occurred despite the fact that in neither group could the listener see the model he or she was to build. Personal contact with one's listener is obviously as important for children's communications as for those of adults.

SUMMARY

Language is recognized as central to human social behavior and cognitive development, but there is much about language that is still either poorly understood or hotly debated.

Infants respond to the human voice by two months of age and can also discriminate subtle differences in the sound of adult speech. By three months they have begun to coo in a way that seems social.

Phonemes are the units of raw material for speech, corresponding roughly to vowel and consonant sounds of a language. Children are almost entirely in command of the phonemes of their language by age three, and it seems that both early verbalizations and aspects of phonetic competence are innately programmed. But adult attention can stimulate babbling and cooing in the young child, and environmental stimulation continues to play some role throughout the entire course of language development.

The course of language development is best thought of as an emerging language competence. Growth in this area involves examining both *semantic development* (understanding the meaning of words and sentences) and *grammatical development* (the formation of permissible language constructions). Grammar is in turn broken down into *syntax* (rules governing sentence construction) and *morphology* (rules for forming words themselves).

Studies have shown that both grammatical and semantic features of an utterance influence how well children will remember it, with meaningfulness being more important as the child grows older. Semantic development evidently progresses more slowly than syntactic development, especially when more complex or subtle forms of language are involved.

A major discovery by those studying syntactic development is that there are certain linguistic universals. For example, in all languages the child's first sentences consist of single words, and the usual forms of children's first two-word utterances are also remarkably similar everywhere. A pivot-open theory of early grammar suggests that position plays an overriding role in the child's construction of two-word sentences, but evidence suggests that function rather than position may be the key factor.

Theories of grammatical development involving reinforcement and observational learning can account for only a portion of the facts, and naturalistic observation shows that parents do not use either reinforcement or modeling as perfectly as learning theories of grammatical development would imply. It seems most likely that children abstract rules from their encounters with speakers and that it is these rules, rather than a library of sentences, that are learned during the first five to ten years of life.

Noam Chomsky's transformational grammar theory suggests that linguistic competence involves converting or transforming the surface structure of an utterance into its deep structure or meaning, and research shows that children's use and understanding of grammar may proceed along these lines.

When language in actual use is considered, young children's communications are often so egocentric that they cannot be understood by an unfamiliar listener.

Social and Emotional Development

Perspectives on Early Experience

CHAPTER

10

OUTLINE

PSYCHOANALYTIC THEORY
  - Structures of Personality
  - Psychosexual Stages of Development
  - Erikson's Views

THE CROSS-CULTURAL PERSPECTIVE
  - Whiting and Child's Psychoanalytic Study
  - Cross-cultural Diversity and the Goals of Parenthood

THE ETHOLOGICAL APPROACH
  - Early Ethological Work

THE EXPERIMENTAL APPROACH: EFFECTS OF SOCIAL DEPRIVATION ON NONHUMANS
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  - Selection 6—Social Rehabilitation of Isolate-Reared Monkeys

ATTACHMENT AND SEPARATION IN HUMANS
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  - Attachment and Reactions to Separation: A Complex Relationship
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THE EFFECTS OF EARLY EXPERIENCE ON HUMANS

SUMMARY

So far our discussion has focused on tracing the emergence of physical, perceptual, and cognitive processes, with little mention of the development of social behavior. Yet it is a truism that humans are highly social. From the moment of birth—usually a social event in itself—children are continually influenced and shaped by those around them. At the same time, even the newborn infant may also influence and shape other people; for example, the more alert and responsive an infant is at birth, the better is its mother's self-image one month later (Duchowny, 1974). Thus, from the beginning, human social and emotional life involves two-way relationships between people.

This chapter is devoted to theory and research describing the early roots of social and emotional behavior; the next two chapters will focus on more specific and often highly complex forms of social interaction that do not fully take shape until later.

There are many reasons why developmental psychologists have been especially interested in the infant's first social and emotional attachments. One is that each child does appear to take on a unique "self" during the early years. An individual's personality—patterns of dealing with others and reacting to them—would probably be utterly confusing without an examination of its possible psychological roots in infancy.

A second and equally important issue is the now very familiar nature-nurture question. We would like to know which aspects of personality, if any, have an inherent component that is present at birth and which aspects are shaped largely or entirely by social experiences and the environment. A careful examination of the child's first social responses might provide some answers.

And, finally, woven into the fabric of all our discussions in this chapter is the question of early deprivation and trauma: Are certain early experiences necessary in order that the young child may develop into a psychologically well adjusted adult? Are other early experiences to be avoided because they may permanently scar an individual psychologically?

Early experience has been examined from many vantage points. There have been simple case study observations, complex longitudinal studies spanning many years, and innovative and sometimes daring experimental studies with animals. The cross-cultural work of anthropologists is also relevant and may actually help us understand why there are so many differences among people even within our own culture.

Despite this diversity in perspective, the writings and work of one man, Sigmund Freud, have been the major influence in alerting both laymen and professionals to the importance of early experience.

PSYCHOANALYTIC THEORY

Freud's theory, highly controversial since it was introduced, is a comprehensive description of psychological development that emphasizes internal or intrapsychic events. Although few developmental psychologists today would subscribe to all of them—and many would shun most of their sweeping generalizations—Freud's views have had a tremendous impact in guiding the development of more sophisticated research and rigorous theory.

By training Sigmund Freud was a physician, concerned with trying to understand the genesis of the symptoms of his suffering patients. This attempt led him to search for missing links and transformations that had occurred earlier in development. Thus, through his career, Freud increasingly became a developmental psychologist.

STRUCTURES OF PERSONALITY

Perhaps the best-known aspect of Freud's theory is the idea that personality consists of three components or structures: *id, ego,* and *superego.* The id, characterized as a reservoir of primitive instincts and drives, is present at birth; it is the force that presses for immediate gratification of bodily needs and wants. The ego is the practical, rational component of personality. Freud posited that the ego begins to emerge during the first year of life, in response to the fact that the infant cannot always have what is wanted. An example of the work of the emerging ego is the child's learning other strategies for coaxing adults into action when crying does not produce immediate results. Finally, between the third and fourth years of life the superego or "moral agent" of personality develops as the child identifies with its same-sexed parent and begins to incorporate adult standards of right and wrong.

PSYCHOSEXUAL STAGES OF DEVELOPMENT

Freud believed that human development proceeds as a series of *universal stages* that all individuals pass through from infancy to adulthood. These stages are largely determined by an innate tendency to reduce tension and achieve a pleasurable experience. Each stage is given its unique character by the development of sensitivity in a particular part of the body or *erogenous zone*—that is, an area that is particularly sensitive to erotic stimulation—at various times in the developmental sequence. Freud described these stages as "psychosexual" to indicate that development is the outcome of the successive focusing on and reduction of tension in various erogenous zones which predominate at different times in life. Each stage is associated with a particular conflict which must be resolved before the child can move psychologically to the next stage.

There are two reasons why difficulty may be experienced in leaving one stage and going on to the next. One is that the child may not be able to satisfy the demands others make at a particular stage; in this case the child's own needs will also not be satisfied and the resulting conflict, according to Freud, can leave a permanent residue of frustration in the individual's psychological makeup. Alternatively, needs may be so well satisfied that the child is unwilling to leave the stage and, as a result, the behaviors that characterize that stage may continue. Thus, either frustration or overindulgence or a combination of the two is presumed to result in some *fixation* at a particular stage of development, although chronologically the individual has already passed through it.

Freud drew an analogy between this situation and military troops on the march. As they advance, they are met by opposition or conflict. If they are successful in winning the first battle (resolving the conflict), then most of the troops (psychological energy or libido*) will be available to move on to the next battle (stage). However, the greater the difficulty in winning the battle, the more troops will be left behind on the battlefield (fixation) and the fewer will be available to go on to the next confrontation. Presumably, all individuals have some psychological investment which remains at each of the stages through which they pass; when the amount is relatively small, only vestiges of earlier patterns of behavior will remain to recur as the individual matures. On the other hand, when a substantial investment of energy has been made at an earlier stage, the individual's personality may become dominated by those techniques of obtaining satisfaction or reducing tension that were used at the earlier period.

Oral Stage From birth through approximately the first year of life, the infant's mouth is presumed to be the prevailing source of pleasurable sensations—for example, the pleasurable sensations associated with sucking.

At the same time, children are physically and psychologically immature, so that they must be cared for by others. They may, therefore, be characterized psychologically in terms of relations of *dependence* (upon the mother or other caretakers) and behavior involving chiefly acts of *incorporation* (taking things in). But, according to psychoanalytic theory, these behaviors are more than specific events; they represent durable or potentially durable styles of interaction with the world. Thus, Strupp (1967) points out that "the focal point of the child's personality organization at this period is not necessarily the mouth

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**Libido* is often described as the energy of the "sexual instincts." But in this context "sex" refers to all pleasurable actions and thoughts, not only those that are principally erotic (cf. Liebert and Spiegler, 1974).

per se but the total constellation of immaturity, dependency, the wish to be mothered, the pleasure of being held, the enjoyment of human closeness and warmth" (p. 23).

Freud believed that individuals who become fixated at the oral stage are likely to develop an optimistic view of the world, to have relationships in adulthood that are primarily dependent in character, to be specially friendly and generous, but to expect, in turn, the world to "mother them." We can readily see how this type of theorizing, which is central to psychoanalytic theory, attempts to explain patterns of later behavior in terms of earlier experiences.

The oral stage is said to end when the child is weaned, and with weaning comes the conflict that is presumed to be crucial during this period. That is, the more difficult it is for the child to leave the mother's breast or the bottle and its accompanying pleasures, the greater will be the proportion of libido left at this stage.

Anal Stage From about one to three years of age, the focus shifts to the anal zone, with its functions of elimination and retention. Until this time, the infant presumably has experienced few demands from others, but now there appear to be direct attempts by parents to interfere with the pleasure obtained from the excretory functions. Thus, the conflict of this stage is between these demands from society and the sensations of pleasure associated with the anus.

Various aspects of the anal period may be related to later behavior. If children view their feces as a possession, toilet-training experiences may be the foundation for a host of attitudes about possessions and valuables (Baldwin, 1967). If the bowel movement is viewed as a gift to parents, love may become associated with material possessions or bestowing gifts. Excessive cleanliness or being pedantic also are viewed as stemming from the demands of toilet training. Still other psychological features of this stage involve the development of shame, shyness (a reaction to being looked at), and impulsivity.

Toilet training, then, is the focus of resolving the conflicts of the anal stage. If parental demands are met with relative ease, the basis for self-control is established. If there is difficulty, children may "fight back" by, for instance, deliberately defecating when and where they please—or, more precisely, when and where it displeases parents. Such aggressiveness and hostility, it is reasoned, may be carried into adulthood where they take the form of excess stubbornness, willfulness, and related behavior. On the other hand, the child may react by retaining feces, thus setting the stage for the later characteristics of stinginess and stubbornness.

Phallic Stage At about four years of age, the genital region becomes the focus of libidinal pleasure, as reflected in the young child's masturbation, curiosity, and inspection of the sexual organs. The conflict of this stage, according to Freud's theory, is the desire of the child to possess the opposite-sexed parent and fear of retaliation from the same-sexed parent. In the case of the male child, these features are particularly clear in the Oedipal complex. The young boy, in desiring his mother and thereby competing with his father, also experiences fear of his father, especially of castration at his father's hands. These fears finally are sufficiently intense and anxiety-producing so that the youngster gives up his sexual longings for his mother. This is accomplished through *identification* with his father, which produces for the child the vicarious possession of the mother and, perhaps more importantly, the adoption of the father's behavior, attitudes, and values. As we shall see later, the identificatory process is extremely important in the psychoanalytic description of sex role and moral development for both sexes.

Although Freud postulated an analogous situation for the female child in the resolution of the Electra complex, certain differences prevent this theory from being quite as complete. For the girl infant, the mother, as caretaker, is the first object of love; thus it is necessary to explain how the female develops strivings toward the male parent. Freud suggested that the little girl, in noting the apparent difference between herself and boys in regard to sexual organs, blames her mother for the fact that she lacks a penis, which she assumes she has lost. The resulting loss of affection for the mother is accompanied by increased regard for the father. At the same time, the child also directs envy toward the father because he possesses a penis. It is clear, of course, that castration cannot be feared by the girl, but perhaps the youngster nevertheless is afraid that her mother's disapproval of her incestual desires will manifest itself in an equally threatening loss of love. In any event, Freud believed she comes to identify with her mother and represses, or puts out of consciousness, longings for the male parent.

Latency and the Genital Stage

The final two stages postulated by Freud, latency and the genital stage, are of less importance to understanding the early foundations of social and emotional behavior. Not only do they occur after the age of five or six years but Freud himself considered them insignificant to the development of the basic structure of personality (Baldwin, 1967). Latency includes the years from the resolution of phallic conflicts to puberty and, by definition, is a time during which the libido lies dormant. The latency years are described as a relatively stable and serene period during which the child acquires many cultural skills. During the last psychosexual stage, the genital stage, the libido is seen as being reactivated and directed toward heterosexual objects. Providing that strong fixations at earlier stages have not taken place, the individual is well on the way to establishing fruitful relationships with others and otherwise leading a "normal," satisfying life.

ERIKSON'S VIEWS

One weakness of Freudian theory is its lack of attention to the latency period, which comes just when the child begins school, the first major contact with the larger society outside the immediate family. The importance of this time was ignored by Freud and had to await the attention of other investigators. One such theorist is Erik Erikson, who is regarded as a "neo-Freudian" because he employs the framework of psychoanalytic theory but fashions it in his own direction.

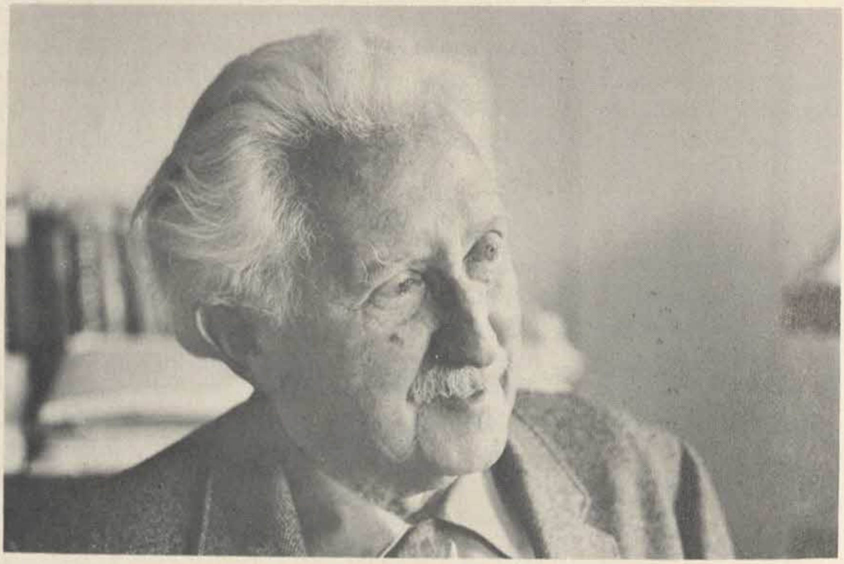


FIGURE 10–1
Erik Erikson. Photo by Jill Krementz.

Erikson accepts the notion that libidinal or emotional energy exists at birth and is at the core of human functioning. He also assumes that development passes through stages, several of which coincide with Freudian ones (Table 10–1). Nevertheless, he has made some distinct deviations from Freudian theory; Maier (1969) has noted three major areas in which these differences exist.

First, Erikson places much greater emphasis on the role of the *ego*, or rational part of the personality, whereas Freud concentrated largely on the nonrational, instinctual components of the personality, which he called the *id*. Because society and the changes that occur in it are important to the developing child, the psychosexual stages postulated by Freud are transformed by Erikson into psycho*social* stages. Second, the growing individual is placed within the larger social setting of the family and its cultural heritage rather than in the more restricted triangle of mother-child-father. Third, Erikson stresses the opportunity each individual has for resolving developmental crises, whereas Freud focused on the pathological outcomes of failure to resolve them adequately. "There is little," Erikson writes, "that cannot be remedied later, there is much that can be prevented from happening at all" (Erikson, 1963, p. 104).

TABLE 10–1
COMPARISON OF ERIKSON'S PSYCHOSOCIAL AND FREUD'S PSYCHOSEXUAL STAGES OF DEVELOPMENT

CHRONOLOGICAL STAGES	ERIKSON'S STAGES	FREUDIAN STAGES
infancy	basic trust vs. mistrust	oral
1½–3 years (approximately)	autonomy vs. shame, doubt	anal
3–5½ years (approximately)	initiative vs. guilt	phallic
5½–12 years (approximately)	industry vs. inferiority	latency
adolescence	identity vs. role confusion	genital
young adulthood	intimacy vs. isolation	
adulthood	generativity vs. stagnation	
maturity	ego integrity vs. despair	

Because of Erikson's emphasis on social context, his theory frequently appears more relevant than Freud's to the kinds of encounters that children have with their everyday world. Additionally, despite his agreement with Freud on the importance of the early years, Erikson's recognition that humans continue to develop throughout the entire life span resulted in a developmental scheme involving eight stages extending from infancy to old age. Thus he provided both a valuable extension to psychological theory and a personal boon to those unalterably beyond adolescence. For our present purposes, however, discussion will focus on Erikson's interpretation of the four earlier stages of life; we will return to the later ones in Chapter 16.

FIGURE 10–2
From birth many socializing agents play a role in the child's social and emotional development. David Strickler, Monkmeyer.

Basic Trust versus Mistrust The foundation of development, according to Erikson, is woven around the theme of trust and hope. Newborns are seen as coming into the world experiencing a change from the warmth and regularity of the uterus. Yet they are not defenseless. Parents, particularly the mother, respond to their bodily needs, and the handling of the child largely determines the establishment of attitudes of trust or mistrust. During the early months contact with the world is not only through the mouth but also through the manner in which parents embrace, talk to, or smile at the infant. If a consistent and regular satisfaction of needs is received, certain expectancies about the world are set up. The child comes to trust the environment and, in doing so, becomes open to new experiences.

Autonomy versus Shame and Doubt The major theme that next evolves, from about 1½ to 3 years of age, is the conflict of whether to assert or not assert one's will. During this time, children rapidly acquire the physical skill to explore the world and begin to see themselves capable of manipulating some parts of it. The young child attempts to establish autonomy, which sometimes requires a disruption of the previously established dependency upon others. But shame and doubt exist alternatively with the thrust for autonomy. They are based on the child's remaining dependency and on fear of going beyond one's capabilities. Toilet training reflects the essence of the conflicts of this stage; shame and doubt result from failure to meet parental expectations and an inability to be assertive, whereas autonomy is the outcome of self-control and assertion.

Initiative versus Guilt Coinciding with Freud's phallic stage, Erikson postulates a conflict between initiative and guilt. The environment of three- to five-year-olds now invites—or even demands—that they assume some responsibility and master certain tasks. The child must initiate action in many spheres—action that sometimes conflicts with and intrudes upon the autonomy of others, and thus results in feelings of guilt. Like Freud, Erikson recognizes the increased interest in sex displayed by both girls and boys at this stage. But he sees the child's attraction for the opposite-sexed parent as less incestual and more the result of a reaching out to the one available representation of the opposite sex who has proven herself or himself. The sense of rivalry that naturally occurs with the same-sexed parent leads to a gradual replacement of the desired parent by other love objects. At the same time a more realistic view of the inequality between child and the same-sexed parent results in stronger relations with peers. The rival parent becomes the ideal toward which to strive (Maier, 1969). During this time, then, the child gradually comes to understand the roles and opportunities presented by society and must overcome feelings of failure and guilt with a sense of accomplishment.

Industry versus Inferiority Given the above outcome, the youngster is ready to grapple with the challenges that arise with entrance into the competitive world of formal schooling. This is the time of latency of sexual striving. With the Oedipal and Electra complexes settled, peers become increasingly important; the child identifies with them and regards them as a standard. The theme of this stage is the mastery of tasks in the face of feelings of inferiority. As children achieve such mastery they become capable of facing the turbulent adolescent years which lie directly ahead. Erickson has much to say about this period, as we will see in Chapter 16.

THE CROSS-CULTURAL PERSPECTIVE

Freud and to a slightly lesser extent Erikson presume that there is a universal sequence of social and emotional development that is followed by all children regardless of the culture in which they are reared. Despite the possible presence of such a sequence, it is obvious that child-rearing practices differ from culture to culture and even from family to family. How general, then, are principles of social development that have been derived almost exclusively from observing children who grow up in industrialized Western countries and whose experience is limited to what an urban or a suburban setting demands or provides? And, equally important, what can we learn about the developmental process itself from the similarities and differences that exist among early childhood experiences and behavior throughout the world? Such questions are the lure that attracts developmental psychologists to cross-cultural research. Our own brief journey here begins with some cross-cultural research performed largely in the service of psychoanalytic theory, and from there we will go on to consider other perspectives as well.

WHITING AND CHILD'S PSYCHOANALYTIC STUDY

We have seen that according to psychoanalytic theory the establishment of dependency or trust occurs very early in life and focuses largely on the mother-child relationship. Freud noted the importance of the mother and her role in arousing both pleasurable and unpleasurable sensations:

> In these two relations lies the root of the mother's importance, unique, without parallel, established unalterably, for a whole lifetime as the first and strongest love-object and as the prototype of all later love-relations for both sexes. [1949, p. 45]

Underlying this significance is the mother's role in satisfying the infant's biological needs. In fact, Freud labeled the mother-child relation "anaclitic" (literally, "leaning on") to denote the child's dependency on the need for sustenance, theorizing that the infant's first love object is the mother's breast (Ainsworth, 1969). Experiences with regard to the feeding situation are, not surprisingly, considered crucial in determining later dependency.

Inasmuch as direct verification of such theorizing through experimental research is impossible, researchers have taken the indirect path of looking at the effects of natural variations in child-rearing practices, as they occur cross-culturally. Are child-rearing practices related to later behavior in ways that Freudian theory predicts? One of the best-known studies addressed to this question was carried out more than twenty-five years ago by John Whiting and Irwin Child, through reports of behavior of individuals in seventy-five primitive cultural settings.

These investigators examined child-rearing practices related to five systems of behavior they judged prevalent around the world: oral, anal, sexual, dependence, and aggression. The first three systems were presumed to be motivated by innate drives and were obviously tied to Freudian theory; dependence and aggression were considered learned but probably universal.

Two general conclusions were reached. One pointed to the prevalence in virtually all societies of similar areas of socialization; all peoples deal with the control of excretory function and sexual impulses, and the shaping of offspring to be independent. But, conversely, a great deal of variability was discovered in the specific goals or ways in which societies carried out their socialization. This can be seen dramatically in the accounts given below of the toilet-training practices found in two different cultures. The Dahomeans were rated as being severe in their practices:

> A child is trained by the mother who, as she carries it about, senses when it is restless, so that every time it must perform its excretory functions, the mother puts it on the ground. Thus, in time, usually two years, the training process is completed. If a child does not respond to this training, and manifests enuresis at the age of four or five, soiling the mat on which it sleeps, then, at first, it is beaten. If this does not correct the habit, ashes are put in water and the mixture is poured over the head of the offending boy or girl, who is driven into the street, where all the other children clap their hands and run after the child singing,
>
> Adida go ya ya ya
> "Urine everywhere."
>
> [Herskovitz, as cited by Whiting and Child, 1953, p. 75]

In the practices of the Siriono, on the other hand, overindulgence can be seen:

> Almost no effort is made by the mother to train an infant in the habits of cleanliness until he can walk, and then they are instilled very gradually. Children who are able to walk, however, soon learn by imitation, and with the assistance of their parents, not to defecate near the hammock.

> When they are old enough to indicate their needs, the mother gradually leads them further and further away from the hammock to urinate and defecate, so that by the time they have reached the age of 3 they have learned not to pollute the house. Until the age of 4 or 5, however, children are still wiped by the mother, who also cleans up the excreta and throws them away. Not until a child has reached the age of 6 does he take care of his defecation needs alone. [Holmberg, as cited by Whiting and Child, 1953, pp. 75–76]

Similar differences are found for feeding and weaning practices. The Kwoma tribe, for example, are extremely indulgent:

> Kwoma infants up to the time they are weaned are never far from their mothers. . . . Crying . . . constitutes an injunction to the mother to discover the source of trouble. Her first response is to present the breast. If this fails to quiet him, she tries something else. . . . Thus during infancy the response to discomfort which is most strongly established is that of seeking help by crying or asking for it. [Whiting, as cited by Whiting and Child, 1953, pp. 91–92]

In contrast, Ainu children have considerably different experiences:

> Put into the hanging cradle . . . the poor little helpless creatures could not get out, and for the rest they were free to do whatever they were able. This usually meant a good deal of kicking and screaming until tired of it, followed by exhaustion, repose, and resignation. [Howard, as cited by Whiting and Child, 1953, p. 93]

In addition to drawing these general conclusions, Whiting and Child tested several specific hypotheses, but we will restrict our discussion to one issue: the psychoanalytic concept of fixation. Recall that from a psychoanalytic viewpoint, *fixation* means psychologically remaining at an early stage of development, either because the stage was extremely frustrating (negative fixation) *or* because it was extremely gratifying (positive fixation). The problem, then, was to relate child-rearing practices to measures of fixation in a way that would be cross-culturally meaningful. How could this be done?

In Whiting and Child's study, societies were ranked first according to how indulgent or severe their child-rearing practices were for each system of behavior. Then, more or less independently, they were ranked according to the degree that fixation was manifested in the society's cultural practices. To take one example of fixation, a society that prescribed taking special potions and herbs for every type of illness and malaise would rank high on measures of positive oral fixation; members of this society would be expected to ward off discomfort and seek pleasure by putting things in their mouths. In a parallel way, explanations of disease in terms of eating bad or evil things or of being victim to an enemy's verbal curses would be scored as negative fixation at the oral stage.

Whiting and Child found some support for their psychoanalytic hypotheses concerning early experience, but the complex pattern of results also makes it clear that many other factors are involved in social and emotional development:

> The general outcome . . . was to justify the separation we made between positive fixation and negative fixation and to provide clear confirmation for the hypothesis of negative fixation. For the hypothesis of positive fixation we obtained in general only some very tentative confirmation. . . . The outcome of our tests of fixation was not uniform for the five systems of behavior we dealt with. . . . [1953, pp. 315–317]

Evidence gathered from several other investigations likewise does not strongly support the proposed relationships of early experience and later behavior derived from psychoanalytic theory. For example, regarding studies that seem to show a relationship between feeding experiences and dependency in young children, Ferguson notes:

> These studies are beset by a number of methodological problems, but it seems that the main difficulty is the preoccupation with orality inherited from psychoanalytic theory [that] led to a focusing on the wrong aspects of mother-infant interaction [1970, p. 61]

The psychoanalytic emphasis on orality to which Ferguson refers thus has given way to more systematic cross-cultural investigation of other dimensions of experience that play a role in early social and emotional development. Here the greatest contributions come from anthropology.

CROSS-CULTURAL DIVERSITY AND THE GOALS OF PARENTHOOD

Cross-cultural analyses have helped us to see that there are two major types of parental goals: All parents want things *from* their children, but they want certain things *for* their children as well. The particulars of course differ from one culture to another. Middle-class Western parents talk of what they want from their children in terms of affection and enjoyment, while parents in developing countries want (and expect) their children to respect elders and contribute labor to domestic and food-producing efforts of the family unit, even at an early age. There is more universality in what parents want for their children. In fact LeVine (1974) has suggested three goals that *all* parents have for their children:

> 1. The physical survival and health of the child including (implicitly) the normal development of his or her reproductive capacity during puberty.
>
> 2. The development of the child's behavioral capacity for economic self-maintenance during maturity.
>
> 3. The development of the child's behavioral capacities for maximizing other cultural values—e.g., morality, prestige, wealth, religious piety, intellectual achievement, personal satisfaction, self-realization

—as formulated and symbolically elaborated in culturally distinctive beliefs, norms, and ideologies. [1974, p. 230]

These universal goals are arranged in an important order and are by no means haphazard. Sheer physical survival during childhood is the requirement for the development of any later capacities and so assumes paramount importance in environments that pose great danger to the young. In much the same way, it is reasoned within this view that concern with economic self-maintenance must be considered before the relative luxury of maximizing one's status and prestige can be pursued. Do things really work this way? The evidence suggests that they do.

LeVine's review of studies done in African, Latin American, and Indonesian communities with very high infant mortality rates shows that practices in these societies are highly responsive to environmental threats. The general practice in these cultures is to keep the infant on or near the caretaker's body at all times, day or night, and to respond quickly to crying, usually by feeding. On the other hand, development of self-maintenance skills receives little attention during this period. By Western standards these mothers rarely smile at their infants or even make eye contact with them.

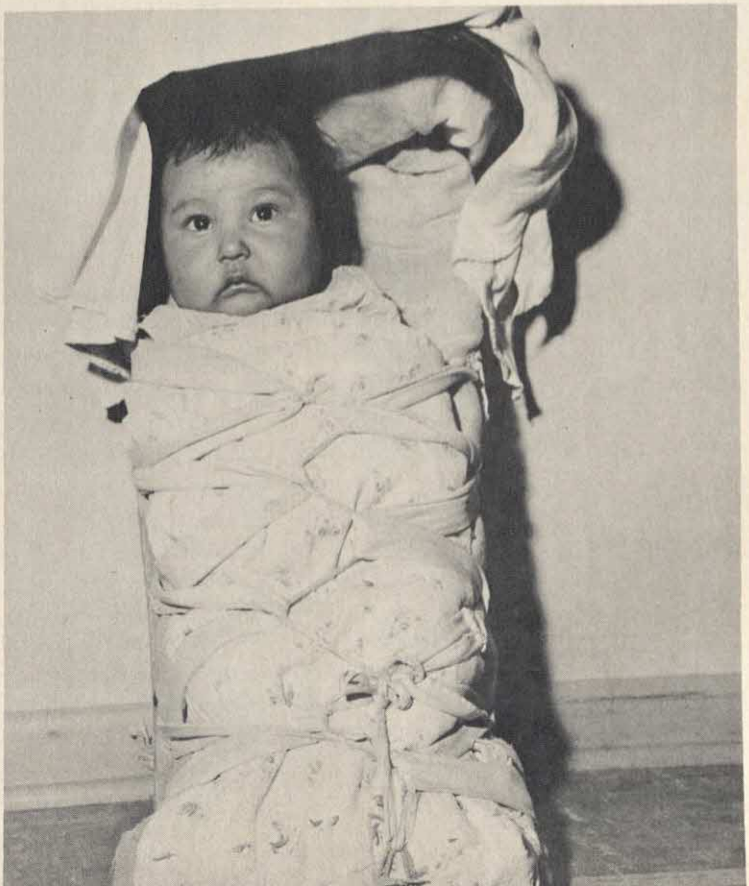


FIGURE 10–3
New Mexican Navajo papoose. It has been suggested that child-rearing practices such as the cradle board evolved, in part, to assure the infant's survival in rugged environments. Colvin, Monkmeyer.

Suppose we now turn to societies in which infant mortality is not so high, but in which food and related materials for subsistence are scarce. Here our expectation would be that child-rearing practices will reflect the new priority and emphasize the development of behavior that will ensure economic self-maintenance later. This is the very pattern that has been found (Kohn, 1969; Langman, 1973; Munroe and Munroe, 1972).

In a word, the major goal parents have in subsistence societies is to produce children who are *obedient*. Some of the advantages are obvious. An obedient child can contribute to food and craft production or at least baby-sit competently and thereby free parents to do productive labor. But exclusive emphasis on the benefits enjoyed by parents of obedient children would be misleading; the children benefit from the obedience training as much or more than the parents do. "The African parents with whom I have worked," writes LeVine, "want their children to become obedient in part because they believe it is the single most important quality involved in adult economic adaptation, and they are concerned that their children have the capacity to survive in a world of scarce and unstable resources" (1974, p. 237).

Not everyone compelled by circumstances to worry about subsistence lives abroad. Poor working-class parents in the United States are subject to the same environmental pressures in bringing up children as is the Latin American peasant. So it should not be surprising that cross-cultural studies reflect the similarity: working-class parents in both the United States and European nations emphasize obedience and conformity in their child-rearing practices more than do middle-class parents in those same countries (Kohn, 1969). In this respect, poor working-class white parents in Chicago are more similar in values to Yucatec Mayan peasants than to middle-class whites living in the same city (Langman, 1973).

We have seen that cross-cultural studies in human societies can give us a glimpse of aspects of the earliest relationship between parents and children that are universal in development, and also help us to understand some of the diversity that exists between and even within societies. An equally searching way to ferret out universal principles of early development involves observational studies of other species, as is done by those taking the ethological approach.

THE ETHOLOGICAL APPROACH

The term *ethology* is derived from the Greek word *ethos*, which means habit or convention. The roots of ethology as a scientific discipline are most clearly traceable to zoology (Eibl-Eibesfeldt, 1970). The ethologists have focused their efforts on the study of animals; this strategy permits a more detailed examination of social behavior than is usually possible with humans. Like Freud, though, they have taken a strongly biological tack. Ethologists search for universal regularities in the behavior and development of a species.

A basic thesis of the ethological viewpoint is that all animals, including humans, possess species-wide characteristics which are the foundations for the development of at least some social behaviors. As Freedman (1968) has noted, "... [this] emphasis ... is not meant to deny that familial and cultural institutions do indeed differentially influence behavior and personality. We ... emphasize that such institutions only support or shape man's behavior and do not create it, as it were, out of the blue" (p. 2). From this point of view, behavioral dispositions are considered to have evolved as the result of a Darwinian process of natural selection. Pressures from the environment exerted over long periods of time ensure that members of a species with the most adaptable behavior are most likely to survive and, thus, pass these characteristics on to their offspring. It is argued, then, that behavioral patterns shared by all members of a species are, or were, necessary or adaptive.

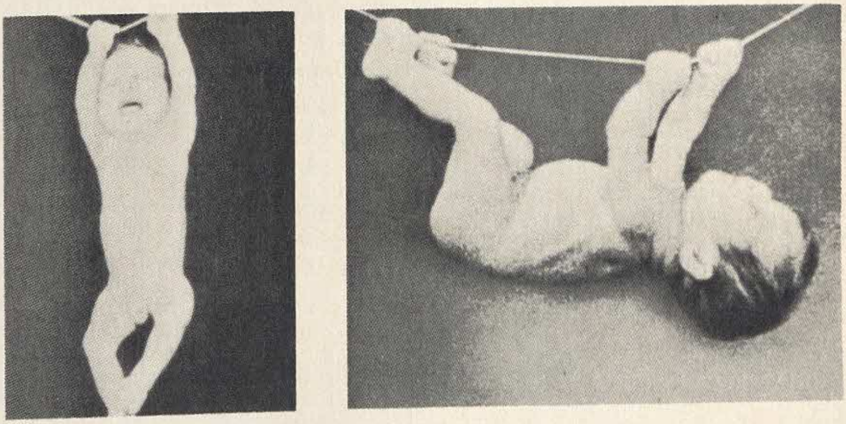


FIGURE 10–4
The grasping reflex in a seven-month-old premature infant. From A. Peiper, Irenäus Eibl-Eibesfeldt, Grundrib der vergleichenden Verhaltensforschung, Ethologie. © R. Piper & Co. Verlag Munchen 1967.

The manner in which ethologists have employed the evolutionary perspective to account for human behavior can be illustrated by considering the grasping reflex of the human infant. As we saw in Chapter 3, the infant will respond to a light touch on the palm by closing the fingers firmly around the object. Figure 10–4 above shows a premature infant (gestational age of seven months) hanging by its hands and then by its hands and feet to a clothesline. In an effort to account for this reflex in terms of its presumed evolutionary origins, one prominent ethologist offers the following analysis:

> The grasping reflex undoubtedly served originally the purpose of holding onto the mother's fur. This reflex is often considered a rudiment because man no longer possesses fur and therefore the reflex is thought

> to be no longer functional. The behavior does not seem to have completely lost its function, however; one can observe how small infants sleep close to their mother's body and how they hold onto her clothing. [Eibl-Eibesfeldt, 1970, p. 400]

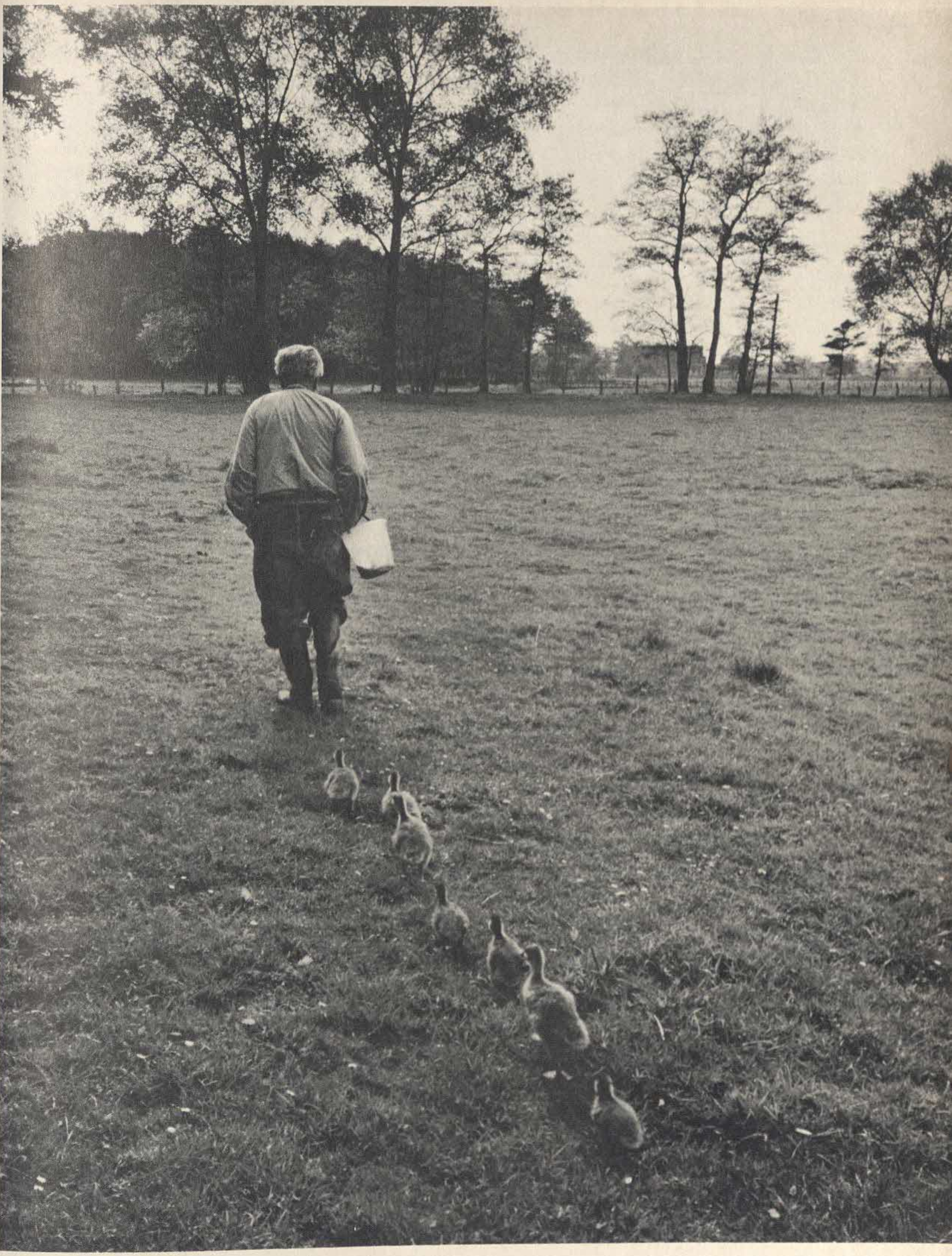
Similarly, it is argued that infant behaviors such as crying or smiling reflect basic patterns that are "wired in" to all human young and form the basis of attachment to caretakers. The theory is supported by a series of naturalistic investigations spanning a period of more than one hundred years.

EARLY ETHOLOGICAL WORK

In 1873 D. A. Spalding observed the tendency in young chicks to approach and follow moving objects virtually from the time they were born. His analysis of this highly reliable "following response" was that it was an innate tendency in the organism, one that was functionally advantageous for survival. At an early age, when the chick is most vulnerable, its chance for survival is increased markedly by following its mother "automatically" (without having to learn to do so) to places where food is plentiful and danger least likely. To make his argument viable, Spalding recognized that he would have to demonstrate that the following response was not simply learned very early in life. To do so, he devised a demonstration which was ingenious for its day. Just as newborn chicks were breaking out of their shells—before they had opened their eyes—Spalding covered their heads with small hoods which fitted around the neck by an elastic thread. He thus prevented the chicks from learning the following response in any way from watching other birds. Nevertheless, when the chicks were finally unveiled, they followed the first moving object that crossed their field of vision. The following response was built in by nature, as Spalding had suspected.

It was not until the pioneering work of another investigator, Konrad Lorenz, that great interest in the following response appeared in psychological circles. Lorenz referred to the following behavior that was observed initially in young birds as "imprinting" (1937), a translation of his native German word *Pragung* (more literally, "stamping in"). He demonstrated imprinting by publishing a film in which he himself served as the first object that appeared after birth in the visual field of ducklings; the film displayed baby ducklings following him as he walked through the fields (Figure 10–5) or swam in a lake; the ducklings even flew to him as he flapped his arms from atop a small hill.

FIGURE 10–5 (Opposite)
Konrad Lorenz and ducklings demonstrating the imprinting phenomenon. From "An Adopted Mother Goose," *Life*, August 22, 1955, p. 74. Copyright: Thomas McEvoy, *Life* Magazine, ©1955 Time Inc., by permission.



Using a writing style that was both clear and vivid, Lorenz also illustrated dramatically the uniqueness of the phenomenon:

> . . . imprinting has a number of features which distinguish it fundamentally from a learning process. . . . First among the points . . . is that the object acquisition in question can only take place during a brief critical period in the life of an individual. In other words, a very specific physiological state in the young animal's development is required to accomplish it.
>
> Secondly, once the physiologically critical period is over, the animal knows the imprinted object of its innate reaction . . . as though this knowledge were innate. It cannot be forgotten! [Lorenz, 1935, cited in Sluckin, 1965, p. 8]

This statement introduced a new concept, the *critical period*, a very short span of time in the early life of the organism during which a permanent and binding attachment to a particular object is formed. When the notion of critical period is extended somewhat, it provides a possible model for viewing human behavior. Specifically, it suggests that the absence of certain types of experiences during early development (i.e., at some hypothetical, critical period in the life of the human organism) will produce debilitating and nonreversible consequences for a variety of behaviors in later life. But only experimental research can tell us firmly whether early deprivation could debilitate us in this way.

THE EXPERIMENTAL APPROACH: EFFECTS OF SOCIAL DEPRIVATION ON NONHUMANS

Freud and the ethologists agree that the early years are critical for normal social development. Their work has led to increased interest in the effects of early experience, particularly appropriate contact with other members of the species. But what happens if this contact is not available? Much of our knowledge on this matter comes from experimental work with animals.

ISOLATION IN DOGS

In one series of studies, Scottish terriers were separated from their mothers immediately after weaning and were cut off from the rest of the world by being placed into individual pens with opaque sides (Thompson and Melzack, 1956). The pups, who never saw their human caretakers either, were tested after seven to ten months. Their reactions were compared with those of control Scotties who had spent the same time living with families outside of the laboratory or, in a few cases, living free in the research facilities.

In order to examine fear reactions, the investigators exposed the dogs to strange objects such as an opening umbrella, a human skull, and a swelling balloon. The control animals, who were reared normally, did not show much excitement but simply ran away. The pups reared in isolation, on the other hand, were highly agitated, whirled about, and stalked the objects purposelessly. When retested a year later in the same manner, they had become more like the controls; they were still excitable but exhibited more purposeful avoidance. However, the normal controls had by now developed new reactions—attacking the objects with playful snapping, biting, barking, and growling—not shown by the isolated animals.

ISOLATION IN RHESUS MONKEYS

The most important and intriguing experimental studies of isolation have been done with rhesus monkeys, a species chosen for research because its members are small and manageable yet remarkably close to the human species. Among the earliest of these studies was a series done by Harry Harlow and his associates, designed to find out whether adequate food, water, and a clean environment—the material advantages, if you will—are sufficient for adequate psychological development. Or, to put it another way, the Harlow group wanted to determine whether infant monkeys need the warmth and contact of another creature during the first months of life in order to develop into normal social animals. The basic model for these investigations was simple. Young rhesus monkeys were separated from their real mothers at birth and were given one of two types of mother "surrogates." One surrogate was made of wire mesh, with only a simple block marked by two eyes serving as the head; the other was made of soft terrycloth and had more elaborate facial features (see left panels of Figure 10–6 below).

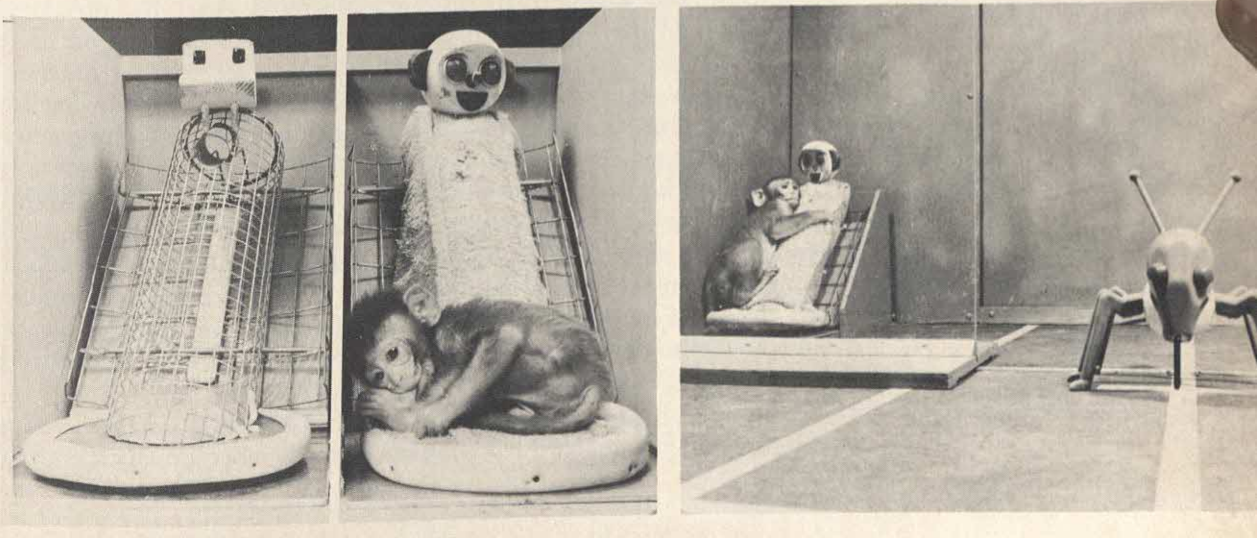


FIGURE 10–6
Left, the wire and cloth "surrogate" mothers used by Harlow and his associates. Right, the infant's typical response was to run to the cloth mother when frightened even if it had been fed only by the wire one. From H. F. Harlow and R. R. Zimmerman, Affectional responses in the infant monkey. *Science*, 159, **130** (August 21, 1959), 421–432, figures 1, 23. By permission of the publisher and Harry F. Harlow, University of Wisconsin Primate Laboratory.

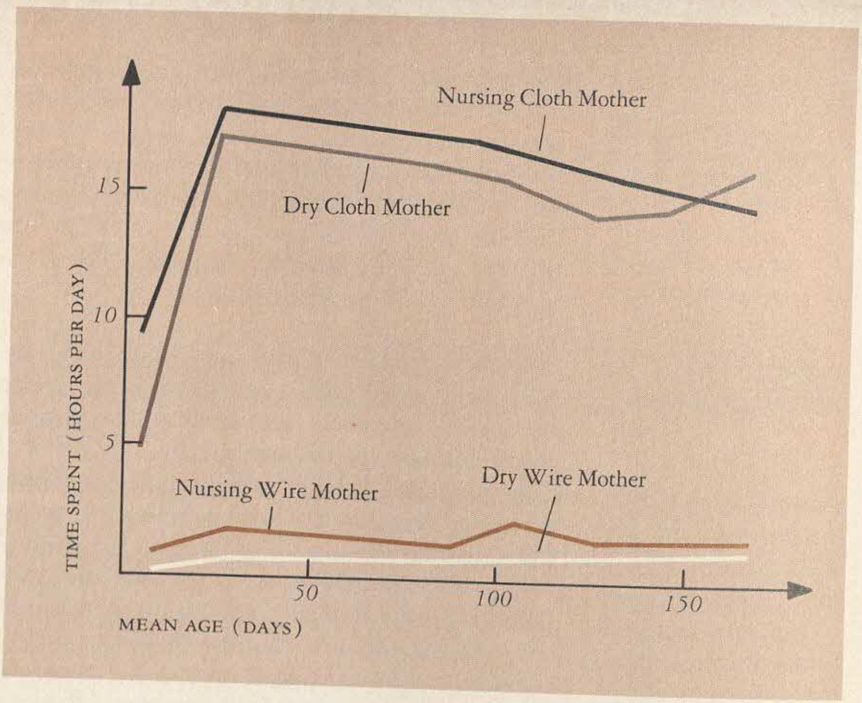


FIGURE 10–7
Amount of time infant monkeys spent with their cloth and wire surrogate mothers. Adapted from H. F. Harlow and R. R. Zimmerman, Affectional responses in the infant monkey. *Science*, **130** (1959), 421–432.

In a now classic study (Harlow and Zimmerman, 1959), the newborn monkeys were placed individually in a cubicle with both a wire and a cloth surrogate. Half of the infants received milk from the wire surrogates while the cloth mothers "nursed" the other half. Observations of total time spent in contact with the surrogates showed that the monkeys preferred the cloth mothers, regardless of the source of nourishment (Figure 10–7). Those who received milk from the wire surrogates went to them for that purpose, but otherwise remained with the cuddly terrycloth mothers much of the time. Even with increasing age and opportunity to learn, they did not come to prefer the wire surrogate.

Harlow and Zimmerman also demonstrated that the affectional bond between the infants and the cloth mothers was based on more than the latter's being a comfortable resting place. They observed the monkeys' reaction to various fear stimuli, such as a moving toy bear or buglike creature. Once again, regardless of the feeding situation, the infants displayed a preference for the cloth surrogate and contact with it appeared to reduce their fear (see Figure 10–6, right).

Results such as these suggest that something other than feeding gratification, most likely physical contact, contributes to the attachment between the infant and its parents. And, of course, such contact was provided in the experiments we have been discussing so far, at least by cloth "mothers." What would happen, though, if infants were reared without any contact?

To answer this question, Harlow and Harlow (1970) isolated young rhesus monkeys at birth in a stainless steel chamber in which all light was diffused, the temperature controlled, the air flow regulated, and all environmental sounds filtered. Food and water were provided automatically and the cage was cleaned by remote control. Thus, all physical needs were met, but during the course of early development the animals saw no other living creature. After being so raised for either three, six, or twelve months, each monkey was taken from the specialized chamber and placed in its own individual cage. Thereafter, the Harlows exposed these subjects to a peer (another monkey who had also been reared in isolation) and to two otherwise similar monkeys who had been reared in open cages with others. All four individuals were then put in a special playroom, typically for half an hour a day, five days a week, for six months. The playroom was equipped with a variety of toys designed to elicit activity and play. The Harlows report:

> *Fear is the overwhelming response in all monkeys raised in isolation.* Although the animals are physically healthy, they crouch and appear terror-stricken by their new environment. Young that have been isolated for only three months soon recover. . . . But the young monkeys that had been isolated for six months adapt poorly to each other and to the controls. They cringe when approached and fail at first to join in any of the play. During six months of play sessions, they never progress beyond minimal play behavior, such as playing by themselves with toys. What little social activity they do have is exclusively with the other isolate in the group. When the other animals become aggressive, the isolates accept their abuse without making any effort to defend themselves. For these animals, social opportunities have come too late. . . .
>
> Monkeys that have been isolated for twelve months are very seriously affected. . . . Even primitive and simple play activity is almost nonexistent. With these isolated animals, no social play is observed and aggressive behavior is never demonstrated. Their behavior is a pitiful combination of apathy and terror as they crouch at the sides of the room, meekly acceptng the attacks of the more healthy control monkeys. We have been unable to test them in the playroom beyond a ten-week period because they are in danger of being seriously injured or even killed by the others. [1970, p. 95, italics added]

The Harlows' research shows the very great debilitating effect of being left in social isolation and thus raises another important question: Can the effects of early social isolation be reversed?

In fact, the first efforts to provide "therapy" for young monkeys reared in isolation were largely unsuccessful and suggested the rather disquieting conclusion that lack of appropriate contact during the first few months of life may leave permanent and irreversible scars. But then, in an experiment signaling a major breakthrough in our grasp of early social development, Stephen Suomi and Harry Harlow (1972) came upon a therapeutic strategy that proved highly successful. Selection 6, which follows, is an abridged version of Suomi and Harlow's original report.

SELECTION 6

SOCIAL REHABILITATION OF ISOLATE-REARED MONKEYS*

Stephen J. Suomi and Harry F. Harlow

The devastating effect of total social isolation upon monkey behavior is an exceptionally well-documented finding in primate behavioral research. Although 3 months of total social isolation from birth has yielded only transient and reversible behavioral effects (Boelkins, 1963; Griffin & Harlow, 1966), isolation for the first 6 months of life or more has consistently resulted in profound and permanent psychopathology (Harlow, Dodsworth, & Harlow, 1965; Harlow & Harlow, 1962; Harlow, Harlow, Dodsworth, & Arling, 1966; Mason, 1963; Rowland, 1964; Sackett, 1968a; Senko, 1966). Upon emergence from total social isolation, monkeys fail to exhibit age-appropriate social and exploratory behavior. Instead, their behavioral repertoire is dominated by self-directed activities, including self-clasping, self-mouthing, huddling, and stereotypic rocking. Such abnormalities persist as the subjects mature. Appropriate sexual responses are virtually absent among adult isolate-reared monkeys, and those females artificially inseminated typically display inadequate maternal behavior toward their initial offspring. Aggressive behavior of isolate-reared monkeys is commonly self-directed or, when it occurs in social situations, inappropriately directed.

In contrast, isolation rearing apparently has little effect upon monkey learning capability. Although isolates are slower to adapt to most learning test situations (Harlow, Schiltz, & Harlow, 1969) and to extinguish certain nonreinforced behaviors previously operantly conditioned (Gluck, 1970), these deficits may be attributed to performance rather than intellectual variables. Once properly adapted to a Wisconsin General Test Apparatus, isolate-reared subjects solve complex learning problems as readily as do feral-born monkeys (Singh, 1969).

Two theoretical explanations for the socially destructive effects of isolation for monkeys have dominated the literature, although neither has had its origin in primate research. The "critical period" approach (Scott, 1962), initially an embryological concept and more recently applied by ethologists to avian attachment behavior (e.g., Lorenz, 1965), postulates that subjects progress through critical periods of social development. According to a strict interpretation of the theory, a subject denied appropriate social stimulation during a critical period will be rendered incapable of subsequent normal social development. A second theoretical position, stemming from research using canine subjects (Fuller & Clark, 1966), maintains that the bizarre behavior patterns exhibited by monkeys removed from isolation is the

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*This research was supported by United States Public Health Service Grants MH-11894 and RR-00167 from the National Institutes of Health to the University of Wisconsin Primate Laboratory and Regional Primate Research Center, respectively. The authors express their appreciation to S. David Kimball and Hal Treharne who collected most of the data, to Carole Mohr who helped to summarize the data, and to Helen Lauersdorf who supervised the final preparation of the manuscript.

result of "emergence trauma," that is, a shock precipitated by an abrupt shift from an unstimulating environment to one of relatively high complexity.

In view of the apparent discrepancy between intellectual and social effects of isolation rearing and of the alternative theoretical explanation posited, numerous attempts to rehabilitate isolate-reared monkeys have been initiated. Virtually all of these efforts have been summarily unsuccessful, a result consistent with critical period theory. For example, researches designed to shape appropriate social behavior in isolate-reared monkeys via aversive conditioning procedures produced only limited behavioral changes which failed to generalize beyond the experimental situation (Sackett, 1968b). Efforts to alleviate postulated emergence trauma via gradual introduction to environments of increasing complexity did not achieve significant rehabilitation of isolate social behaviors (Clark, 1968; Pratt, 1969). Repeated exposure to socially competent age-mates also had little apparent therapeutic success (Harlow, Dodsworth, & Harlow, 1965). In fact, such exposure may have actually exaggerated isolate disturbance behavior. By 6 months of age, well-socialized monkeys have developed complex patterns of social interaction, including vigorous play and socially directed aggression. They will typically attack any stranger monkey introduced to their social group, and only if the stranger reciprocates the attack will it be "accepted" and mutual play follow. The monkey that does not fight back continues to be the victim of aggression. In retrospect, it is not surprising that isolate-reared subjects were consistently attacked when exposed to well-socialized peers, nor is it surprising that these isolates failed to exhibit significant social recovery.

However, there exist data suggesting that isolate-reared subjects may be responsive to certain social agents and that exposure to such agents may have positive therapeutic value. Isolate-reared mothers who eventually submitted to their infants' efforts to maintain ventral contact usually exhibited adequate maternal behavior toward subsequent offspring (Harlow & Harlow, 1968). Also, monkeys exposed to heated surrogates upon emergence from isolation showed significant decreases in disturbance behavior after contacting the surrogates. In neither case was social rehabilitation complete. The isolate mothers continued to exhibit incompetent sexual behavior, and the isolates exposed to surrogates failed to develop a sophisticated social repertoire.

It seems obvious that any experimental effort designed to rehabilitate isolates via social exposure requires effective social agents or "therapists." What types of monkeys could be appropriate therapists? In view of the above data, one might select animals who would predictably initiate social contact with an isolate without displaying social aggression, and who themselves would exhibit simple social responses which gradually would become more sophisticated. Such requirements are fulfilled by socially experienced monkeys only 3 or 4 months old, for at this age clinging responses still form an integral part of their social repertoire, play is in the primary stage of development, and aggressive behavior has not yet matured. In accord with these fundamental social considerations, the following rehabilitation study was initiated.

METHOD

Subjects

ISOLATES Isolate subjects were four male rhesus monkeys *(Macaca mulatta)* born within a 2-week period. They were separated from their mothers at birth and maintained in the laboratory nursery (see Blomquist & Harlow, 1961) until their mean age was 10 days, when they were placed in individual isolation chambers (see Rowland, 1964) which effectively denied them physical and visual access to all social agents. The isolate subjects remained in the chambers until their mean age was 6 months.

THERAPISTS Therapist subjects were four female rhesus monkeys, also born within a 2-week period, but 3 months subsequent to the isolates. They were separated from their mothers at birth and maintained in the laboratory nursery for the first 30 days. They were then placed in individual quadrants of a quad cage, described by Suomi and Harlow (1969), and each monkey was provided with a heated simplified surrogate (see Harlow & Suomi, 1970). In addition, the therapists were permitted 2 hours of mutual social interaction 5 days per week. During three sessions per week they interacted as pairs within the quad cage; during the remaining two 2-hour sessions per week they interacted as a group of four in a social playroom, described by Rosenblum (1961).

Procedure

POSTISOLATION BASE-LINE PERIOD When the mean ages of the isolates and therapists were 6 and 3 months, respectively, the isolates were removed from their chambers. All subjects were then placed in individual quadrants of two quad cages, with two isolates and two therapists in each cage. The therapists retained their surrogates and continued to receive 2 hours of social interaction 5 days per week as described above, while the isolates were not permitted to interact socially with other monkeys or with surrogates. The postisolation base-line period lasted 2 weeks.

POSTISOLATION THERAPY PERIOD Immediately after the base-line period, the following therapy procedure was initiated: (*a*) In therapy weeks 1–4, each isolate was allowed to interact with the therapist monkey adjacent to its quadrant for 2 hours per day, 3 days per week. (*b*) In therapy weeks 5–6 pair interaction (one isolate-one therapist) continued as described in *a*. In addition, the isolates were placed in the playroom with the therapists 1 hour per day, 2 days per week, in groups of four (two isolates, two therapists). (*c*) In therapy weeks 7–11, pair interaction (one isolate-one therapist) was reduced to two 2-hour sessions per week. The playroom sessions were expanded to three 1-hour sessions per week. (*d*) In therapy weeks 12–26, pair interaction was discontinued and replaced by two 2-hour sessions per week during which time all four members of each quad cage (two isolates, two therapists) were permitted free interaction within the quad cage. Playroom interaction continued as in *c*.

To summarize, following removal from isolation, the isolates were housed individually for a period of 2 weeks in order to assess postisolation behavioral levels. Twenty-six weeks of therapy followed. The first 4 weeks of therapy consisted of isolate-therapist interaction within the quad cage. Beginning at the fifth week, the isolates were also permitted social interaction with therapists and with each other in the playroom. . . .

RESULTS

Three unequivocal findings emerged from the data analysis. First, isolate subjects developed significant behavioral abnormalities during the period of social isolation. Second, the isolate subjects exhibited virtually no trace of "emergence trauma" upon removal from isolation. Third and most important, the isolates showed significant recovery, in terms of both nonsocial and social behaviors, in all testing situations during the course of the therapy period.

Isolation period behaviors

During the first 2 months of life isolate and therapist monkeys failed to differ significantly on any measure except locomotion, with the isolates locomoting less than the controls ($p < .05$). During the third and fourth months, the only significant group difference was in self-mouthing, with the therapists exhibiting higher levels ($p < .05$). However, during the final 2 months of the isolation period marked behavioral differences between isolates and therapists became evident. The isolates exhibited significantly higher levels of self-clasping ($p < .01$), rocking ($p < .05$), and stereotypy ($p < .01$) than the therapists, changes which reflected increases over previous levels by the isolates rather than decreases by the therapists. These behaviors have consistently been found in the past to differentiate isolate-reared monkeys from more adequately socialized controls. During this time period the isolates also exhibited lower levels of exploration than the therapists ($p < .05$). Thus, although the analysis disclosed few differences between isolate and therapist levels of behavior early in life, by 6 months of age the isolates were clearly exhibiting gross behavioral abnormalities in comparison with their therapist controls.

Postisolation base-line behaviors

Comparison of the isolates' postisolation behavioral levels with their counterparts during the immediately preceding isolation period gave little indication of significant change following removal from isolation. No significant differences for any category were disclosed by the *t* tests. Thus, the data failed to substantiate the occurrence of measurable emergence trauma among the isolate subjects in this experiment. Rather, the isolates' abnormal behaviors, having developed during the period of isolation, remained at existing levels when the monkeys were removed from isolation.

Therapy period behaviors

The data from all three testing situations offered convincing evidence that significant gains were achieved by the isolate subjects during the therapy period. When first removed from their isolation chambers they exhibited high levels of disturbance behaviors and low levels of social behaviors, typical for monkeys socially isolated for the first 6 months of life. By the end of the therapy period, however, their behavioral levels were virtually indistinguishable from those of the socially competent therapist monkeys.

BEHAVIOR DURING QUAD CAGE THERAPY That the isolates exhibited significant recovery in the quad cage interaction situation during the therapy period was evident from the results of the appropriate Duncan tests. . . . During the first 60 days of the therapy period, isolate subjects exhibited significantly higher levels of self-mouthing ($p < .05$), self-clasping ($p < .01$), huddling ($p < .05$), and rocking ($p < .05$) behaviors and lower levels of locomotion ($p < .05$), clinging ($p < .05$), social contact ($p < .01$), and play ($p < .05$) than the therapist monkeys. These differences disappeared as the therapy period progressed, largely resulting from changes in isolate rather than therapist levels of behavior. From the sixty-first to the one hundred and twentieth day of therapy the two groups of monkeys differed significantly only with respect to locomotion, with the isolates exhibiting lower levels ($p < .05$). During the final 60 days of the therapy period there were no significant group differences on any of the category measures in the quad cage interaction situation.

BEHAVIOR DURING PLAYROOM THERAPY As in the quad cage interaction sessions, the isolate subjects exhibited significant behavioral recovery during the playroom therapy sessions. Initially in the playroom they showed significantly higher levels of self-mouth, self-clasp, huddle, and rock and significantly lower levels of locomotion, exploration, clinging, social contact, and play than the therapist monkeys (all $ps < .01$). During the fifty-first to the one hundredth day of the therapy period detectable group differences vanished except for the categories of self-clasp, for which the isolates showed higher levels than the therapists ($p < .01$) and locomotion, clinging, and play, for which the therapists exhibited higher levels ($p < .05$, $p < .05$, and $p < .01$, respectively). During the final 50 days of playroom therapy the only category to yield significant group differences was self-clasp, with isolates showing higher levels ($p < .05$). . . . the convergence of isolate-therapist behavioral levels over time resulted primarily from changes in isolate rather than therapist levels. Thus, although 9 behavior categories differentiated isolates from therapists during the first days of playroom therapy, the groups were behaviorally equivalent by the end of the therapy period save for the isolates' elevated levels of self-clasping, and for this behavior the isolates showed a significant decline during the therapy period (0–50 days of therapy > 51–100 days of therapy > 101–150 days of therapy, $ps < .01$).

BEHAVIOR IN HOME QUADRANTS Except for the specific interaction sessions, all subjects were individually housed in quadrants of the quad cages during the 6 months of the therapy period. Analysis of home quadrant behavioral levels during this period indicated that the isolates' recovery in the presence of the therapist monkeys generalized to home-cage behaviors in the absence of physical contact with the therapists. . . .

During the first 60 days of the therapy period isolates displayed significantly higher levels of self-mouth ($p < .05$), self-clasp ($p < .01$), huddle ($p < .01$), rock ($p < .01$), and stereotypy ($p < .01$) and significantly lower levels of locomotion ($p < .05$) and exploration ($p < .01$) than the therapist monkeys. During the middle 60 days of the therapy period, group differences were evident only for the behaviors of self-mouth ($p < .05$) and self-clasp ($p < .01$), with isolates exhibiting higher levels of both behaviors. During the final 60 days of the therapy period, no significant group differences for any category were disclosed by the analysis.

DISCUSSION

The primary finding of this experiment was that monkeys reared in total social isolation for the first 6 months of life exhibited significant recovery of virtually all behavioral deficits across all testing situations after appropriate therapeutic treatment. Reversal of the isolation syndrome to an equivalent degree over such a range of situations had not been previously achieved or approached via any experimental procedures.

Some previous rehabilitative attempts used social agents but failed to reverse the isolation syndrome. We feel that the crucial factor for successful rehabilitation in the present study was intrinsic to the nature of the social agents employed. As well as the fact that they were members of the same species as the isolates, these agents were chosen specifically in terms of behaviors they could be predicted to exhibit consistently and spontaneously at appropriate stages of the therapy program. Behavioral predictions were based upon years of research examining the normal social development of the rhesus monkey.

A sequential, subjective account of the actual rehabilitative process early in the therapy period illustrates the appropriateness of the therapist choice. The isolate subjects did not exhibit spontaneous recovery during initial exposures to the younger, socially normal monkeys, a fact that is not surprising since no isolate monkey had shown spontaneous recovery in previous experimental situations. Rather, the therapist monkeys actively initiated the first social interactions, and only then did the isolates gradually exhibit improvement. Specifically, the therapist monkeys' initial responses to the isolates were to approach and cling, while the isolates were typically immobile and withdrawn. Only after clinging had been initiated did the isolates reciprocate, and only when the therapists had directed play responses toward the isolates did isolate play behavior emerge. Once these interaction patterns were established, the isolates themselves initiated play bouts with progressively increasing frequency.

Although the process of rehabilitation was essentially continuous, it is possible to delineate two stages of isolate recovery. The first stage involved breaking down previously established patterns of abnormal, self-directed behaviors such as self-huddling and stereotypic rocking. This was achieved primarily through the clinging efforts of the therapist monkeys. An isolate receiving intimate social contact cannot effectively continue to rock and self-huddle. The breaking down of entrenched self-directed activity permitted the isolate subjects to engage in alternative behaviors, which took the form of elementary social contact, exploration, and locomotion.

The second stage involved developing the simple behaviors described above into a more complex, socially appropriate behavioral repertoire. Again, the therapists apparently provided the crucial stimulation as they themselves developed a complex social repertoire in the course of normal maturation. With respect to these behavior patterns, isolate recovery was substantial.

Previous rehabilitative attempts which initially exposed isolate subjects to complex social stimulation failed to break down self-directed activity exhibited by the isolates, and recovery did not follow. Also, exposure to a surrogate was demonstrated to reduce isolate disturbance behavior, but because a surrogate cannot provide complex social stimulation those isolate subjects never developed complex social behaviors in the presence of a surrogate. In contrast, the present study provided the isolate subjects with a set of social stimuli designed to reduce self-directed activity, followed by a set of stimuli gradually increasing in social sophistication. In this case, the same group of therapist monkeys provided both types of stimulation and provided them in the appropriate temporal sequence during the course of their own normal social maturation.

These results suggest that a reexamination of traditional theoretical interpretations of isolation-rearing effects is required. The data from the present study are inconsistent with a strict interpretation of the critical period position, which implies that once a so-called critical period has transpired without social stimulation, normal social behaviors can never develop. The present results yield empirical testimony that relatively normal social development can occur following 6 months of total social isolation from birth provided that the isolates are exposed to appropriately selected social stimulation. One can conclude that either the first 6 months of life do not constitute a critical period for socialization of the rhesus monkey or that strict critical periods do not exist for this species. We prefer the latter interpretation. While it is obvious from numerous researches that the first 6 months of life are indeed critical for socialization under usual circumstances, a more apt terminology for this chronological span might be "sensitive period" or "sensitive phase" (Hinde, 1966).

Also, the postisolation base-line data do not specifically support an emergence trauma interpretation of isolation-rearing effects. Rather, the monkeys socially isolated in this study had developed obvious behavioral anomalies prior to emergence, but the data analysis disclosed no significant increments in these abnormalities following emergence. We do not claim that emer-

[illegible] from isolation but as behavioral consequences. The actual analysis compared preisolation behavioral levels with those accompanying a [illegible] period following removal from isolation and may not have [illegible] social effects [illegible] during the initial postisolation weeks. However, acknowledgments of behavioral changes resulting from shifts in the environment, it is far too facile a [illegible] of attributing behavioral differences to the process of environmental change.

It is appropriate at this point to express a certain degree of caution regarding the findings of this study, particularly in light of the absence of a group of control [illegible] subjects not exposed to therapists, although, in a sense, a decade of isolation research using monkeys provides an impressive body of control data. The [illegible] procedures [illegible] in contrast to the isolation conditions during the course of the experiment. Moreover, since the isolate subjects have not yet reached physical maturity, assessment of their adult social capability is not possible at the present time. Further, the [illegible] procedures described above may not be appropriate for monkeys subjected to longer periods of social isolation, and will [illegible] necessarily be effective if not instituted soon after the period of isolation.

Nevertheless, the fact that the isolates in this study did show increased social gains suggests that the potential for adequate social development is not necessarily destroyed by the isolation experience. Rather, the actual relationship between isolation rearing and social behavior may, in fact, be similar to the relationship between isolation rearing and learning capability. Previous researchers have demonstrated that while isolation produces performance deficits in learning situations, intellectual capability remains relatively intact in isolated subjects. Apparently, adequate adaptation is required for adequate performance. With respect to social behavior, it may well be that previous studies have reported performance deficits only, that social capability remains intact despite the isolation experience, and that the requirement for rehabilitation is merely appropriate social stimulation. If this finding generalizes not only to other forms of early [illegible] but also to other species, then the implications of the present experimentation for reversal of psychopathological behavior attributed to inadequate early experience become enormous.

ATTACHMENT AND SEPARATION IN HUMANS

In light of the research we have been discussing, it is not surprising that developmental psychologists have become increasingly interested in studying social attachments during human infancy. Attachment, dependency, and (to a lesser extent) object relationships have all been used to refer to the same basic idea. Each suggests a strong and highly focused relationship between the caretaker (usually the mother) and child involving strong dependency and deep or intense emotional feelings. Such attachments are almost always reciprocal—the infant receives nourishment and care from its mother, while the mother receives reinforcing smiles, attention, and pleasing vocalizations from the infant. A young child is obviously dependent to a very large extent on its mother, but the parent also looks to the child for positive feelings of worth, ac-

will produce effects (shaking a rattle produces an interesting noise, and crying lustily will bring a concerned and willing parent), and this certainly helps to discriminate between oneself and the world outside one's skin. It appears that most infants will give sustained visual regard to another person by about four weeks of age and will begin to show differential responses to persons and objects, Step 2 in the scheme, shortly thereafter (Yarrow, 1972).

Discriminating the primary caretaker from other persons There are two specific ways in which an infant indicates that it can discriminate familiar from unfamiliar people, and both involve differential responding. Most simply, the infant can be presented with its mother and a stranger; if the child looks at the mother more than at the stranger, then at least passive discrimination must be taking place. We can also look for active discrimination, as when the baby smiles differentially toward its mother or actively reaches out for her. Differential responding appears between thirteen and twenty-four weeks of age in most infants, neatly following the discrimination of familiar and unfamiliar inanimate objects (Bayley, 1970; Yarrow, 1972).

Developing specific expectations toward one's mother It is also through changes in response that we detect the infant's special expectations toward its mother. A distressed six-month-old may stop crying as soon as its mother appears, or perhaps actually begin to cry more intensely, either of which would suggest that the baby expects immediate care. And again, the parallels with other aspects of development are important:

> Just as the infant must have acquired the capacity for perceptual discrimination to be able to respond differentially to mother and stranger, the acquisition of specific expectations towards the mother is dependent on several cognitive attainments: the development of a rudimentary memory, the acquisition of the concept of the existence of objects outside his immediate perceptual field, some elementary concept of means-ends relationships, and a differentiated schema of the mother. As with other cognitive developments, there are probably differing degrees of object permanence before it is fully established and consolidated. [Yarrow, 1972, p. 89]

Developing trust and confidence in the mother or caretaker The infant's relationship with its mother finally emerges as complete when the child shows confidence in its mother. Confidence can take many forms. For example, trust is shown by waiting more patiently for gratifications that are not immediately forthcoming. But trust, perhaps the most important component of attachment, is most clearly seen when the infant responds to strangers. These reactions are very different, depending on whether the mother is present or not, and therefore infants' reactions to separation have been studied extensively.

ATTACHMENT AND REACTIONS TO SEPARATION: A COMPLEX RELATIONSHIP

What happens when an infant is briefly separated from its mother and finds itself in a strange environment or encounters strange people? We would certainly expect that the depth of the child's attachment to its mother would play an important part in our answer, but some of the details disclosed by research have been surprising.

In a major study of separation and attachment, Schaffer and Emerson (1964) studied the behavior of sixty infants longitudinally over a period of eighteen months. These investigators devised a series of situations paralleling everyday life in which the infant experiences separation—for example, being left alone in a room, being left with someone other than the mother, and being put down after being held. Schaffer and Emerson reasoned that the child's immediate responses to each of these situations would provide an index of the degree of attachment to the separated adult. To obtain this information they interviewed mothers four times a week up to each child's first birthday and once more at eighteen months. Parents were asked about their infants' reactions during the time immediately preceding each interview.

A second, related issue involving the infant's reaction to strangers was measured directly during the home visit. At the beginning of every visit, the interviewer approached the infant in a series of steps. First, the interviewer appeared in the infant's visual range, standing still; then he successively smiled and talked to the infant without moving closer; then he approached the infant while smiling and talking, made physical contact by touching or stroking the child, offered to pick the infant up by holding out his hands; finally, he picked the infant up and sat the youngster on his knee. The specific point at which the infant began to show fear, as evidenced by whimpering, crying, lip trembling, adopting a fearful facial expression, or drawing back, thus could be assessed.

Among the major findings was that the *onset* of attachment to specific individuals occurred for most infants between the age of six and nine months, although the range varied from five months to past one year. Overall fear of strangers came about a month later than attachment (see Figure 10–8). Thus, seeking proximity of certain familiar figures cannot be explained simply by the tendency to seek protection from strangers. Note, though, that there was also a tendency for children who formed attachments early to develop fear of strangers early.

The *intensity* of attachment for specific individuals peaked between forty-one and forty-four weeks and again at seventy-eight weeks. The investigators, judging from their observations of some of the children, note that new motor skills developing between forty-four and seventy-eight weeks (e.g., crawling, sliding, walking) may have been responsible for this finding, for the children apparently were interested in the novelty of their new feats and thus were willing to leave their mothers.

Protesting separation Schaffer and Emerson see the youngsters' reaction to strangers as an index of the strength of mother-infant

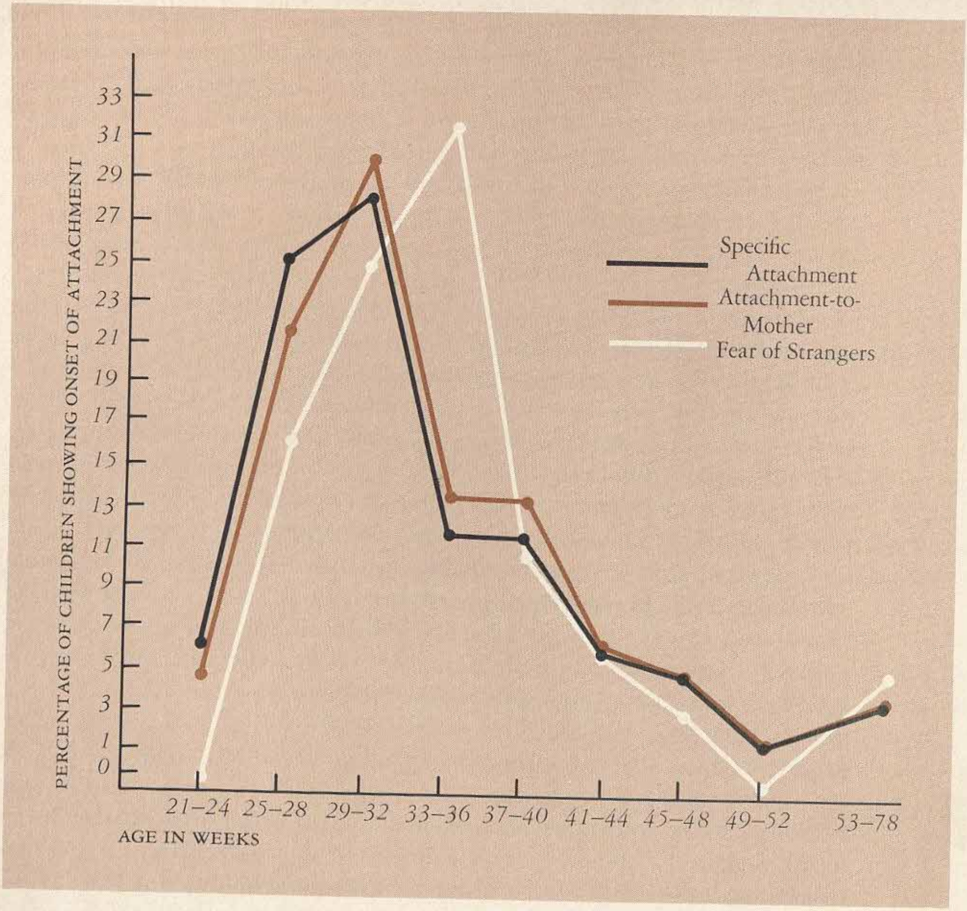


FIGURE 10–8
The development of attachment in infants in the Schaffer and Emerson study. Adapted from H. R. Schaffer and P. E. Emerson, The development of social attachments in infancy. *Monographs of the Society for Research in Child Development* (1964), 29, no. 3. Copyright 1964 by the Society for Research in Child Development, Inc., by permission.

attachment, but other investigators have argued that the phenomenon is more complex. Spelke and her associates (Spelke, Zelazo, Kagan, and Kotelchuck, 1973), for example, suggest that infants may protest separation when they are thrust into unfamiliar situations that they cannot assimilate; in such instances it is the mother's familiarity, and the loss of a familiar face when she leaves, that may bring on distress.

There is a surprising amount of evidence to at least partially support this view. For one thing, infants are less likely to protest being left alone in a strange room if they are "accompanied" by their favorite blanket than if they are not (Passman and Weisberg, 1972). It is the familiarity of the blanket that presumably provides comfort.

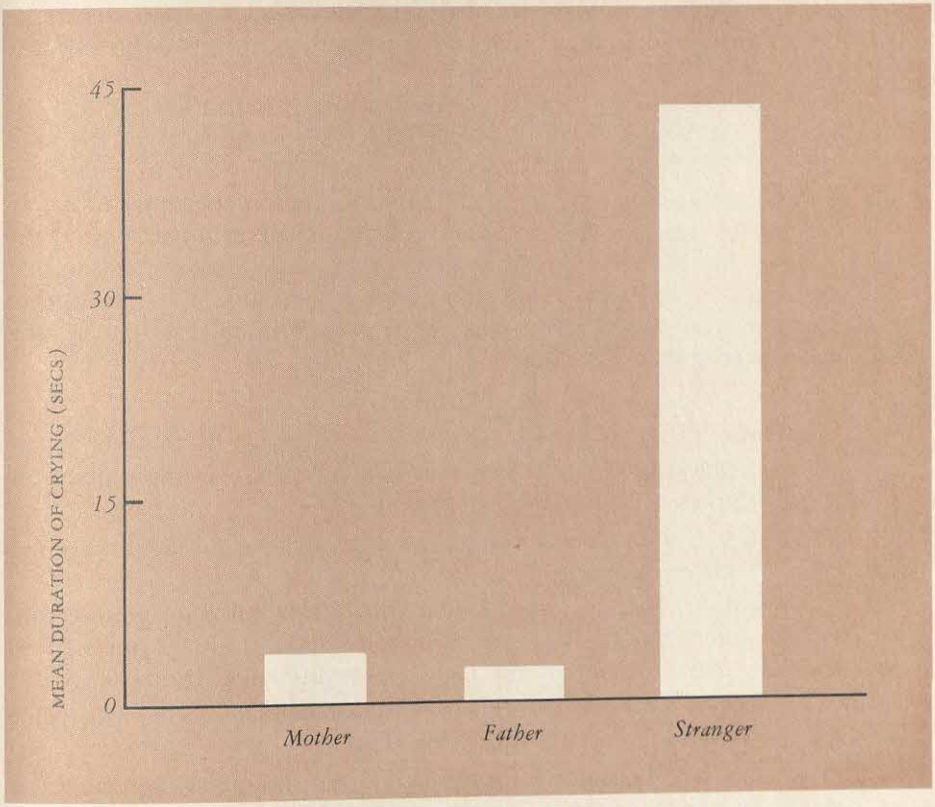


FIGURE 10–9
Average duration of crying by 36 one-year-old infants when left in a strange room with each of three adults. Although these infants are almost certainly more closely attached to their mothers, even the mere presence of their fathers is sufficient to provide comfort to the child in unfamiliar circumstances. Adapted from Spelke *et al.*, 1973.

The familiarity hypothesis receives further support from the finding (Littenberg, Tulkin, and Kagan, 1971) that in a home setting infants become much more upset when the mother leaves by a door she uses rarely than by one she uses frequently. And it has now been demonstrated several times that the presence of the father is as comforting as the presence of the mother in certain unfamiliar situations (Kotelchuck, 1972; Spelke *et al*, 1973). A typical result, based on careful observation of thirty-six children who were one year old, is shown in Figure 10-9.

THE BEGINNINGS OF SEPARATION: EXPLORATORY BEHAVIOR

Attachment serves infants well, for they surely would find themselves in peril should they become separated from their mothers before they have skills in fending for themselves. On the other hand, exploratory behavior also facilitates survival as the infant moves out from the caretaker and begins to learn about the surroundings. It is not surprising, then, that exploration gradually increases with age in a variety of species (Rheingold and Eckerman, 1970).

Ainsworth and her associates (Ainsworth and Bell, 1969, 1970; Ainsworth and Wittig, 1969) have explored the reciprocal relationship between attachment and exploration by arranging for infants to be brought individually by their mothers into an experimental room. In this room there were three chairs in a triangular arrangement; at the apex of this display stood a child's chair surrounded by toys, the mother, and another adult who was a stranger to the infant. Both the mother and the stranger behaved according to an experimental script, creating the following eight episodes:

EPISODE 1. The baby was carried into the room by the mother accompanied by an observer who subsequently left. The episode lasted three minutes.

EPISODE 2. The mother placed the baby on the floor and sat in her chair for three minutes.

EPISODE 3. The stranger entered, sat quietly for one minute, conversed with the mother for one minute, and then gradually approached the baby. After three minutes, the mother quietly left the room.

EPISODE 4. The stranger and the infant remained alone in the room for three minutes.

EPISODE 5. The mother returned and the stranger exited unobtrusively, leaving the mother and infant alone for three minutes.

EPISODE 6. The baby was left alone for three minutes.

EPISODE 7. The stranger returned and stayed with the baby for three minutes.

EPISODE 8. After the mother returned and the stranger left, the session was terminated.

The fifty-six infants in the study, aged forty-nine to fifty-six weeks, were observed from an adjoining room through a one-way vision screen. Measures of exploratory, proximity, contact-seeking, and contact-maintaining behaviors were recorded. It was found that exploratory behavior of three kinds—locomotor, manipulative, and visual—occurred most frequently when only the mother was present. In contrast, this type of activity decreased sharply when the stranger entered the room and, for the most part, remained depressed during the period when the stranger and the baby were alone. It decreased again when the mother left the room a second time and diminished still further when the stranger entered. These data are presented graphically in Figure 10–10.

Efforts to gain and maintain contact with the mother were weak during the early episodes when the parent was present, but increased

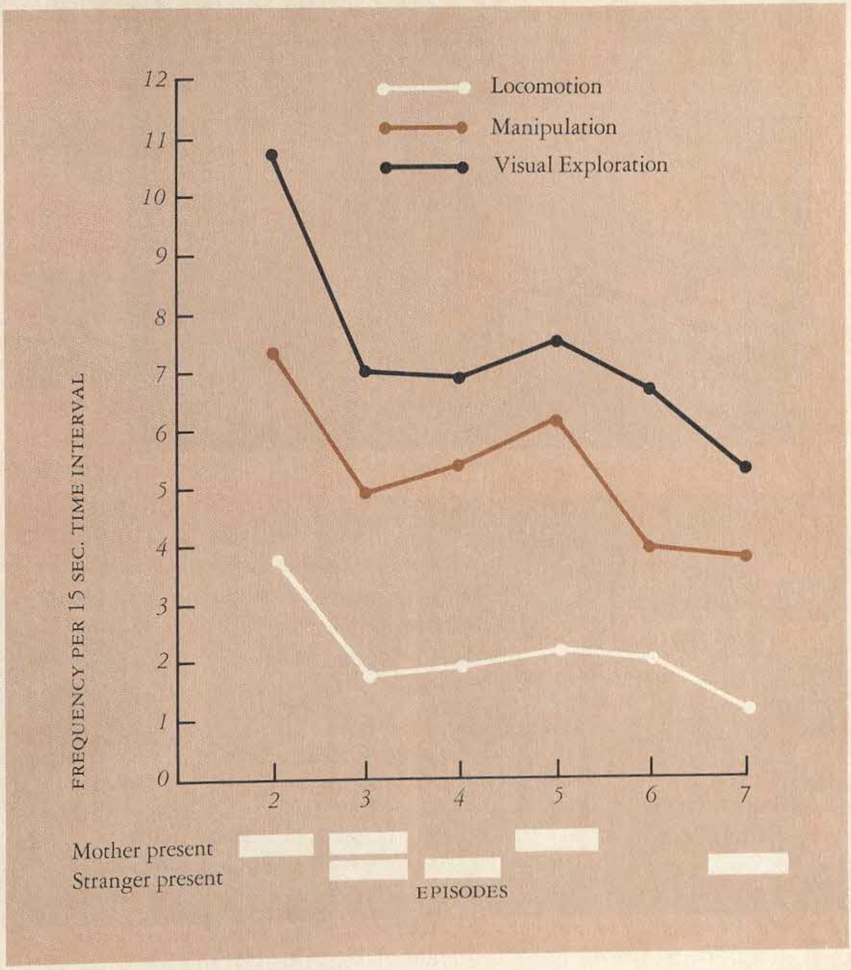
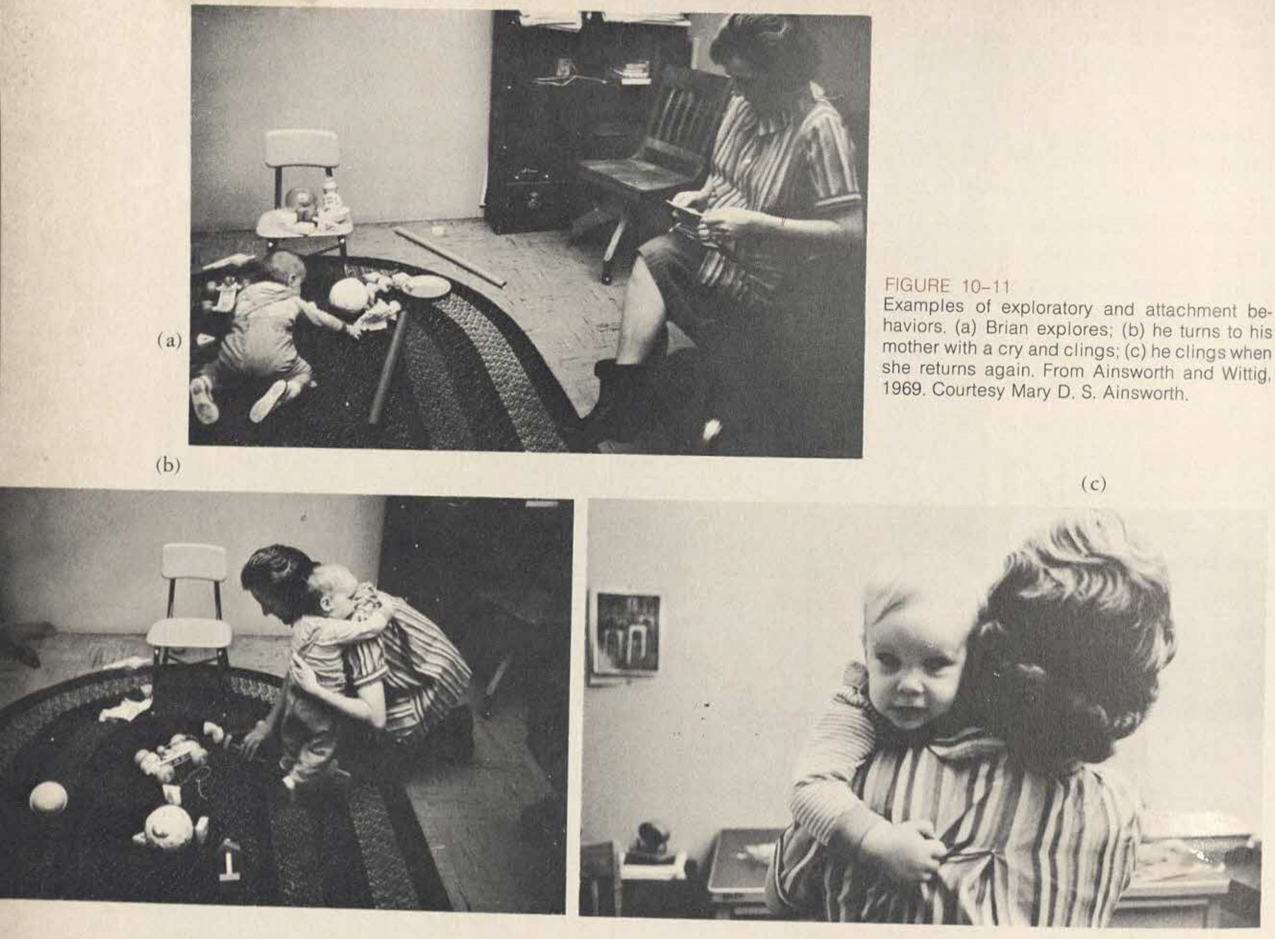


FIGURE 10–10
Incidence of three kinds of exploratory behavior in the Ainsworth and Bell study. Adapted from M. D. S. Ainsworth and S. M. Bell, Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. Child Development, 41 (1970), 49–67. Copyright by the Society for Research in Child Development, Inc., by permission.

in strength during the brief periods of separation. Contact-maintaining responses rose during the first reunion and increased even more sharply during the second reunion. Some of the behavior exhibited by one of the infants, Brian, is depicted in Figure 10–11.

From these findings emerges a complex pattern of covariation between attachment and exploratory behavior. When the mother is present, exploration is evoked and attachment is suppressed; the mother apparently provides the infant with a "secure base" from which to observe the surroundings (Ainsworth and Wittig, 1969). In contrast, the absence of the mother reverses the pattern so that curiosity is


(a)

(b)

(c)

FIGURE 10–11
Examples of exploratory and attachment behaviors. (a) Brian explores; (b) he turns to his mother with a cry and clings; (c) he clings when she returns again. From Ainsworth and Wittig, 1969. Courtesy Mary D. S. Ainsworth.

severely depressed and attachment behavior is intensified. Some infants approached the friendly stranger in each episode, several clung to her when she picked them up during Episodes 4 and 7, but proximity-seeking and contact-maintaining activity occurred far less frequently toward the stranger than toward the mother.

Given any particular setting, we might guess that certain environmental changes could induce children to leave their mothers and venture forth to explore. Rheingold and Eckerman (1970) have pursued this possibility experimentally, testing the effects of novelty on the amount of time infants spent away from their mothers. Each infant was placed beside its parent in one of two unfurnished adjoining rooms. All twenty-four infants studied were approximately ten months of age, and so could locomote by some means—toddling, creeping on hands and knees, or crawling on their stomachs. The mother sat in the so-called starting room and the infant was free to explore that room and the adjoining one, referred to as the "open field." During the first experiment, the open field remained empty for half of the infants (Group 0) and a toy was placed in it for the other half (Group 1). All the infants ventured without distress into the open field and there was no difference between the groups in time spent in it. Interestingly, this may have been because the Group 1 children carried the toy back to the starting room, where they spent half their time playing with it.

In the second experiment, half of the original subjects in Group 1 had a toy again, while the other half of Group 1 infants had three toys arranged diagonally in the open field. Similarly, in Group 0, half of the infants now had a toy introduced into the open field while the remaining half of the infants in this group had three novel toys introduced. (The toys, then, represented a novel addition for Group 0 but not for Group 1). Now, Group 0 infants entered the open field sooner and spent more time there than did those in Group 1. They also contacted the toy more quickly and played with it for more time. For both groups, three toys elicited more play in the open field than one toy and also induced the infants to stay there longer.

The authors conclude that the speed at which their subjects entered a new environment, how far they went, and how long they stayed were controlled by the number, location, and novelty of certain objects in the new surroundings. They also note that

> the infant's return to the starting room and his reentry into the large room may be considered illustrative of Ainsworth's "exploration from the mother as a secure base." . . . But if the mother is considered a base, the data of our study show that the infant did not always *touch* base; on one-third of the returns, to *see* seemed sufficient. Furthermore, Ainsworth's term *secure* implies the affording of safety, and would be more appropriate here if the return to the mother were a flight from the larger environment. Of this there was no evidence. Quite the contrary; the return was often accompanied by facial and vocal expressions of pleasure and not by signs of fear or of relief from fear. [Rheingold and Eckerman, 1970, p. 82]

So we see again that human social development is indeed complex and frequently has multiple determinants. Although fear and its reduction constitute one aspect of the attachment that individuals form with others, pleasure in another's company also plays an apparent role.

THE EFFECTS OF EARLY EXPERIENCE ON HUMANS

Throughout this chapter we have mentioned the possibility that a child's earliest social and emotional experiences may have a long-term impact on his or her later development. Psychoanalysts have generally assumed this is the case, although their own data are quite weak scientifically (cf. Liebert and Spiegler, 1974). The observations of ethologists and the experimental studies of Harlow and his associates with monkeys support the possibility further.

But even more direct evidence is available. For example, Spitz has described a South American orphanage in which the young appeared to show deterioration in their social behavior after their mothers left them at the age of three months. Spitz (1965) stated that "the infants remained in the Foundling Home, where they were adequately cared for in every bodily respect. Food, hygiene, medical care and so on were as good as or even superior to, that of any other institutions we have observed." There are many similar accounts, and such deficits in general have been attributed to deprivation of maternal love.

But maternal deprivation is a vague term that provides little information about the specific variables that underlie deficiency. A number of years ago, for example, Casler (1961) made a distinction between children who suffered separation from significant adults before six months of age and those to whom it did not occur until later in life. In regard to children in the former group, he concluded, "evidence is accumulating, both on the human and the animal level, that [the cause] is perceptual deprivation—the absolute or relative absence of tactile, vestibular, and other forms of stimulation" (1961, p. 49). With children over six months old, however, he warned that the problem actually is learning about rejection or the severing of an established affectional bond. Recently, Leon Yarrow has offered strong support for Casler's distinction.

Specifically, Yarrow and his associates (Yarrow, Goodwin, Manheimer, and Milowe, 1971) have reported longitudinal data on fifty-three adopted children who were followed for a ten-year period. The question asked was, What relationship, if any, exists between the mothering experiences of a child during infancy and the child's personal and social characteristics at ten years of age?*

Inasmuch as all children in the study were adopted, it was possible to ask about the impact of early separation upon later personality development. For this purpose, the investigators compared three groups of children: (1) those who went directly from the hospital to their permanent adoptive homes and therefore experienced *no* separation; (2) those who were assigned temporary foster mothers and then went on to permanent adoptive homes before they were six months of age; and (3) those who were separated from their initial foster mothers and placed in permanent homes after they were six months of age. The results showed that at age ten there were no differences between the group that was separated early and the group that was not separated at all on any measure of any interpersonal or social adjustment. In sharp contrast, children separated from their initial foster mothers after the age of six months were markedly lower than the others at age ten on a measure of social discrimination, that is, the child's capacity to establish different levels of relationship with people. The effect, which was clearly present for both sexes, jibes perfectly with findings discussed earlier that attachments are not really formed in humans before the age of six months, but may be quite important thereafter.

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*As we mentioned in Chapter 4, but in another context, the advantage of studying adopted children is that parent-child similarites will then certainly be based on social factors, rather than on genetic or hereditary similarities between parent and child.

Other data were based on direct observations of the kind of care each infant received in either foster or adoptive homes during the first six months of life. In contrast with the clear long-term effects of separation per se, the kind of care received early in life (provided it was within the normal range) did not seem to influence girls' intellectual or emotional development appreciably. But boys were less resilient. Ten-year-old males whose environment in infancy lacked stimulation and responsiveness fared less well than their peers on measures of intellectual development. These boys were also generally less competent socially, and they experienced greater difficulty than other youngsters in being interpersonally effective or relating in depth to others.

It appears, then, that a child's first social experiences in this world may indeed serve as early and important roots for later personality development. Other influences are also at play, of course, and the development of many interpersonal reactions is shaped in childhood rather than in infancy. We will consider the further development of social interaction and personal values in Chapters 11 and 12.

SUMMARY

This chapter has focused on theory and research concerning early social and emotional behavior, such as the infant's first attachments and social response, as well as the effects of early deprivation and trauma. No one has been more influential in calling attention to the possible importance of early experience than Sigmund Freud. According to Freud's theory, personality consists of three components; the *id*, *ego*, and *superego*. Freud also theorized that all individuals pass through a series of *psychosexual stages* (oral, anal, phallic, and genital). Frustration or overindulgence may result in *fixation* at a particular stage that, according to psychoanalytic theory, is related to personality characteristics in adulthood. Erik Erikson employs the framework of psychoanalytic theory but has placed greater emphasis on society in his identification of several stages of *psychosocial development*.

Cross-cultural studies have pointed to the prevalence in virtually all societies of similar areas of socialization, but there is at the same time a great deal of variability in the ways societies carry out their socialization. Whiting and Child studied child-rearing practices cross-culturally and found some support for their psychoanalytic hypotheses regarding fixation, but their results also show that many other factors are involved in early development. LeVine has suggested that *all* parents have three goals for their children: physical survival, capacity for economic self-maintenance during maturity, and development of the child's behavioral capacities for maximizing other cultural values.

The *ethological approach* also involves the search for universal regularities in the behavior of a species. Behavior patterns are considered to have evolved as the result of a Darwinian process of natural selection. A notable example is the "following response" of chicks, called *imprinting*, which occurs during a critical period of the organism's life.

Animals have been used to experimentally study the effects of social deprivation, such as the study with young monkeys that found they prefer a terrycloth monkey to a wiremesh one even if fed from the latter. For young monkeys reared completely in isolation, fear is the overwhelming response. Efforts to rehabilitate isolated monkeys failed until Suomi and Harlow found a successful method; this provides contradictory data to a strict interpretation of the *critical period* theory.

Although it is much more difficult to study social deprivation in humans, some studies of orphanages suggest that maternal deprivation may result in a deterioration of social behavior. The mother and child are mutually dependent during the formative years, which may be the result of Darwinian natural selection. Leon Yarrow has described the course of social attachments as a series of five ordered steps which the child must accomplish. Schaffer and Emerson see youngsters' reaction to strangers as an index of the strength of the mother-child attachment, but others say it is more complex, suggesting that infants protest separation when they are put into unfamiliar situations that they cannot assimilate. A study concerning the infant's willingness to leave the mother found that infants explore the environment more when the mother is nearby than when left with a stranger; the mother apparently provides the infant with a secure base from which to observe the surroundings. In regard to long-term effects of early experience, evidence suggests that the child's first social experiences do serve as important roots for later personality.

The Shaping of Interpersonal Reactions

CHAPTER 11

OUTLINE

PROSOCIAL BEHAVIOR
    Cooperation
    Helping
    Sharing
AGGRESSION
    Elicitors of Aggression
    Social Learning of Aggressive Behavior
    Extended Discussion—Television and Children's Aggressive Behavior
SEX ROLES AND SOCIALIZATION
    The Extent of Sex Differences
    Sex-Role Learning and Development
SUMMARY

In this chapter we continue our discussion of when and how interpersonal reactions develop. Certain maturational processes play a role in this development, of course, but our central interest here is in the way similarities and differences among children are shaped or *socialized* by various forces in the environment.

The shaping process itself, as we saw in Chapter 10, is rooted in the child's first relationships with parents and caretakers. But at least by the time the child leaves the crib and high chair, other agents of socialization begin to exert their influence. Siblings and peers play a central role in socialization, and soon relevant training and experiences are provided by such societal institutions as the school, church, and mass media. And socialization is complicated by the fact that children shape their environment, at least to some degree, rather than simply being shaped themselves. The hostilities of the bully, for example, may be a product of past training, but they are also the vehicle through which such a youngster changes siblings, peers, and even parents by eliciting submissive or punitive reactions back from them. The complexity of the process is suggested in Figure 11-1.

The following discussion focuses on three more or less separate aspects of social development: prosocial behavior (sharing, helping, and cooperating with others), aggression, and the emergence and nature of sex-role differences. We cannot hope to fully describe how socializing forces play out for each child, but we can outline some of the basic principles that have been identified in the development of these behaviors. Each aspect is dependent upon basic perceptual, cognitive, and learning processes. It is apparent, though, that socialization always involves some kind of teaching and learning, and so it is not surprising that the various forms of learning (see Chapter 6) have been found to be central.

PROSOCIAL BEHAVIOR

Most parents, most teachers, and most religions try to teach children to act in cooperative, helping, or giving ways—at least some of the time and in some situations. Such behavior is usually thought to be in the greater interest of others and society, and over the past fifteen years

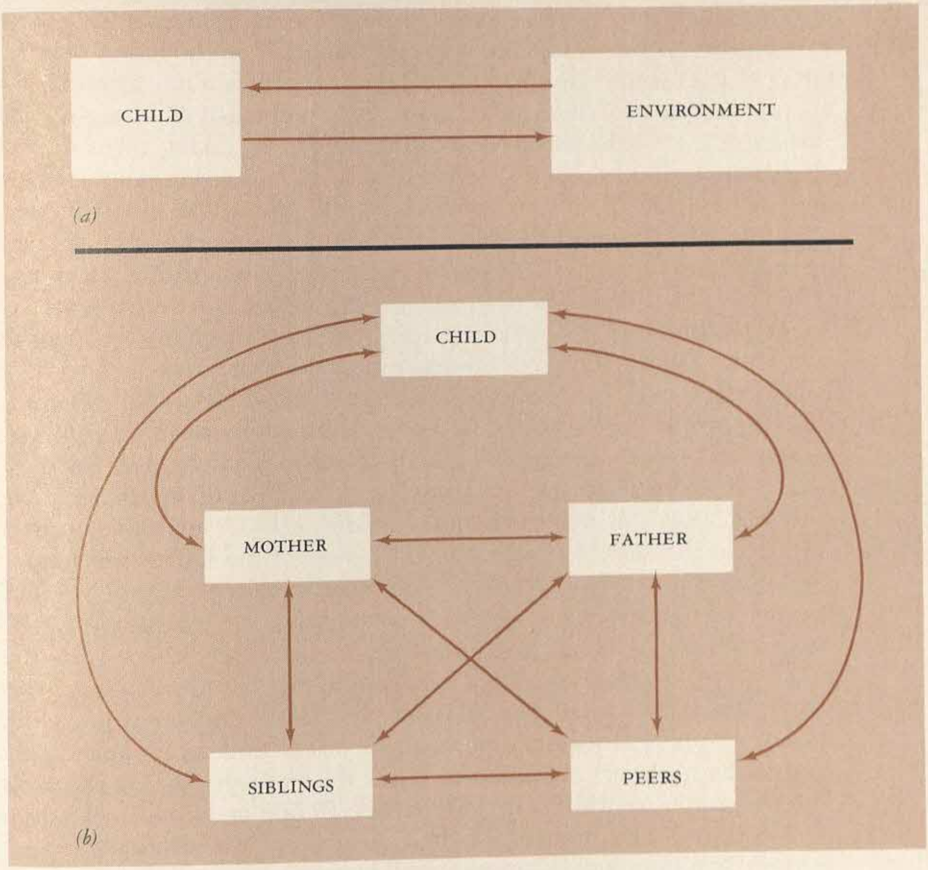

FIGURE 11–1
The child and the environment influence one another in socialization (a), but the interconnections involved are quite complex. Even when simplified by leaving out such factors as the school, church, physical environment, and differences among peers, the environment in which a child develops socially involves the interplay of many forces (b).

or so psychologists have come to call all of these behaviors "prosocial." In this section we consider three classes of prosocial behavior that overlap but are not identical, and we describe research that helps us understand how such actions are developed, maintained, and elicited in childhood.

COOPERATION

Generally speaking, *cooperation* refers to behavior in which two or more people work together for mutual benefit. Such action is considered prosocial because societies are to a great extent built on the foundation of cooperative enterprises. Nevertheless, most developmental psychologists paid little attention to cooperation among children until Azrin and Lindsley (1956) demonstrated that children become more cooperative when directly reinforced for acting this way.

Developmental trends and cultural influences In a situation involving valuable resources or desired outcomes that can be obtained only by cooperation, competition is a nonrational as well as a nonprosocial response. When two children of about equal strength pull, tug-of-war fashion, on a single playground swing instead of taking turns on the swing, they will often end up with tired arms and voices, and perhaps with no one having a turn. For this reason, one would guess that cooperation would gradually overcome irrational competitive tendencies as children become more cognitively mature and reasonable, an expectation held by Piaget himself (e.g., Piaget, 1962). But recent work by M. C. Madsen and his associates has revealed that quite the opposite can occur. In some circumstances, practical cooperation *declines* as a child grows older and irrational competition in situations where it cannot possibly pay off comes to be the dominant mode of responding.

Madsen's basic test situation is depicted in Figure 11-2. Pairs of children of the same age are seated at opposite ends of a small table with a curved top that curls down at the sides. A marble is placed directly in the "marble holder" in the center of the table—this holder prevents it from rolling off to the side. A string fastened to each end of the marble holder permits either child to bring the marble nearer by pulling on his or her string and, if there is no interference from the other player, to finally pull the marble over the mouth of a small cup where it remains as the child's prize. The marble holder is not solid, however; it is held together by magnetic inserts and comes apart quite easily if both players pull at once. When this happens, the marble rolls into the gutter and is lost to both parties. In one major study, Madsen (1971) found that among middle- and lower-class white American children, cooperation during the marble game was quite likely at ages four and five but was virtually absent among the school-age children. On the first ten trials the four- and five-year-old pairs successfully negotiated to obtain more than half of the marbles on the average; among the seven-, eight-, nine-, and ten-year-old pairs, the great majority did not succeed in obtaining any marbles at all!

Further investigations by Madsen have provided additional support for the pattern, in that retarded children are more cooperative (and therefore more successful) in this situation than are normals; and, among the retarded, the younger children are again more cooperative than the older ones. The key to this paradox, Madsen feels, has been found in his cross-cultural research. Mexican children and children raised on kibbutzim (that is, Israeli collective farms) are far more cooperative than Anglo-Americans and, respectively, more cooperative than Mexican-American and city-dwelling Israeli children as well (Madsen, 1971; Shapira and Madsen, 1974). It seems that urban cultures foster competition to the extent that the bounds of rational cooperation are exceeded. The possibility that competition can become blinding is suggested by the verbal comments of children in situations

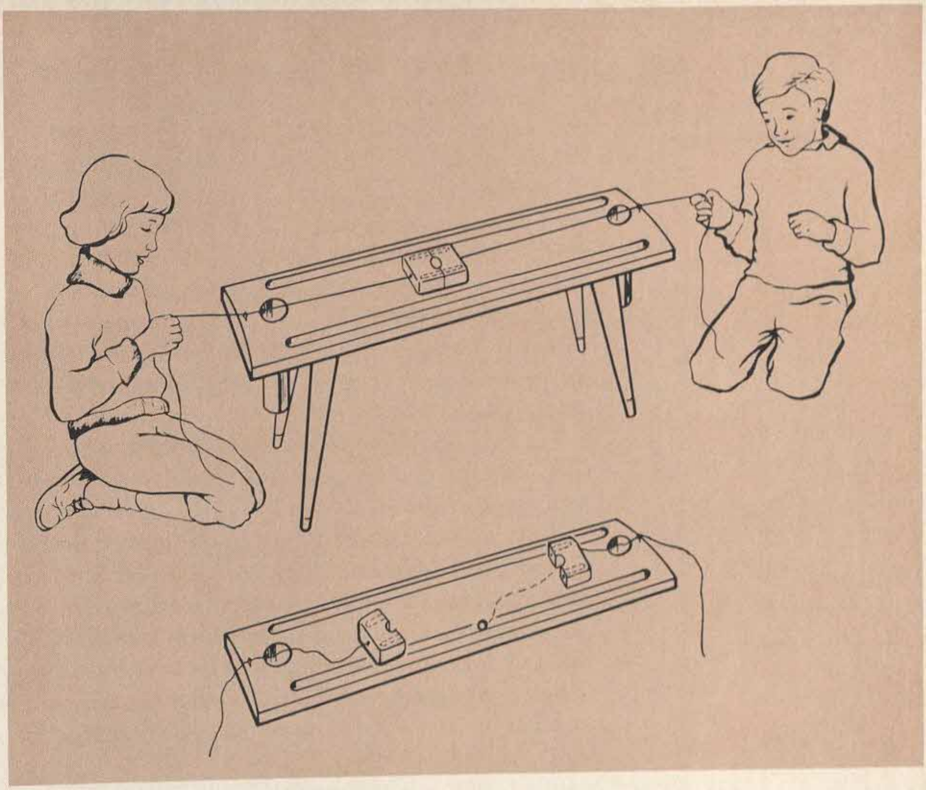

FIGURE 11–2

The marble-pulling game used by Madsen and his associates to measure cooperative behavior in children. A marble is placed in the holder in the center, and either child can earn the marble by pulling it to his or her side. But if both children pull at once, the holder will come apart and the marble itself will roll off into the gutter and be lost to both children. Cooperation is therefore required for success.

FIGURE 11–3

The willingness to cooperate for mutual enjoyment or benefit is evident at an early age. Photo by Peter Vilms.

requiring practical cooperation. In one study it was reported that many children "did not see the cooperative solution. While playing, competitive subjects declared, 'This game is too hard,' or 'No one can win.' When asked after the experiment how they might have gotten some toys subjects most often responded, 'If I could play alone' . . . " (Kagan and Madsen, 1971, p. 38). Perhaps most disquieting of all is the finding that among seven- to nine-year-old American children, situations requiring cooperation often led to participants' actively attempting to lower the outcomes of their partners even when there was no direct gain for themselves (Kagan and Madsen, 1972a). Rivalry of this sort increases with age and is greater among boys than among girls (Kagan and Madsen, 1972b).

Except for the sex difference noted above, the generally low level of cooperation found by Madsen seems to be remarkably uniform among American children. No differences have been found between whites and blacks, nor between those coming from the middle and lower classes (Nelson and Madsen, 1969; Madsen and Shapira, 1970). All U.S. children, at least in some situations, are sufficiently imbued with the value of competitiveness so as to preclude consideration of cooperation. Ultimately, of course, a willingness to cooperate in one's own best interests is not incompatible with an entrepreneurial business ethic. Here there is still much that developmental psychologists do not know. Nonetheless, some progress has been made in identifying experiences that might foster a better understanding of the practical use of a cooperative approach in interpersonal behavior.

Stimulating cooperative behavior What factors will stimulate the development of cooperation? Several have been identified. First, verbally structuring situations in terms of mutual gain by creating a "we" rather than an "I" orientation seems to be important, so that children see themselves as working *with* rather than against each other (Kagan and Madsen, 1971). Second, and not surprisingly, direct experience with the positive consequences of cooperation increases the likelihood that such behavior will occur. In a series of investigations (e.g., Madsen, 1971) it has been shown that guiding children into a practical cooperative relationship and letting them directly experience its benefits (e.g., actually getting more marbles for themselves than would otherwise be the case) markedly increases cooperation in children of diverse cultural backgrounds (Madsen, 1971).

And, finally, modeled examples of cooperative behavior by other children can have a powerful influence on elementary school children. In one study (Liebert, Sprafkin, and Poulos, 1975) children were exposed to a thirty-second television spot designed to teach cooperation through positive example. "The Swing," as this spot was called, opens with a boy and girl running across a field to reach the last remaining swing on a playground; they both reach the swing at the same

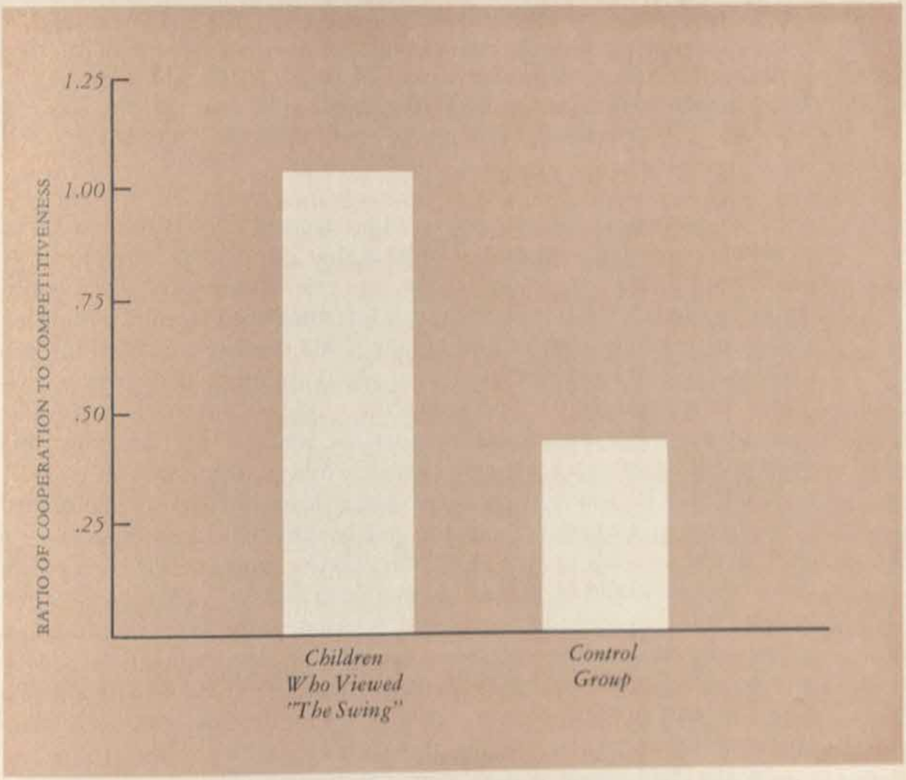

FIGURE 11–4
The effects of exposure to a cooperatively oriented television spot, "The Swing," on children's cooperative behavior. Control group children were shown commercial TV spots that did not have a cooperative message. In the test situation, children could cooperate by taking turns or could compete unfruitfully. From Liebert, Sprafkin, and Poulos, 1975.

time and immediately begin to struggle over it, each claiming first rights. After a moment during which battle seems inevitable, one of the youngsters produces the insight that they should take turns and suggests that the other child go first. Each of the children is finally shown taking her or his turn, joyfully swinging through the air with the help of the other while an announcer's voice says, "There are lots of things you can do when two people want the same thing. One is to take turns . . . and that's a good one." Children exposed to this example are considerably more likely than comparable children not so exposed to exhibit cooperative behavior in a test situation similar to the one used by Madsen (see Figure 11-4).

HELPING

In the late 1960s experimental social psychologists were profoundly influenced by a dramatic murder in New York, which was later described as follows:

> Several years ago, a young woman was stabbed to death in the middle of a street in a residential section of New York City. Although such murders are not entirely routine, the incident received little public attention until several weeks later when the *New York Times* disclosed another side

> of the case: at least 38 witnesses had observed the attack—and none had even attempted to intervene. Although the attacker took more than half an hour to kill Kitty Genevese, not one of the 38 people who watched from the safety of their own apartments came out to assist her. Not one even lifted the telephone to call the police. [Darley and Latané, 1968, p. 377]

This surprising lack of intervention seemed inconsistent with the humanitarian and cooperative norms that our society tries to foster and raised many questions about the role of prosocial behavior in modern life. Partly as a result, much has since been learned about such behavior in adults (Darley and Latané, 1968; Latané and Rodin, 1969). For example, it has been found that adults are more likely to give assistance in an emergency if they are the only bystanders than if others are present. But an important question remains for developmental psychologists: How is a willingness to help others acquired at all?

Staub (1971) has hypothesized that at least two factors are critical: the ability to empathize with the needy other and possession of the knowledge or skills to help effectively. To the extent that this reasoning is correct, it should be possible to increase children's willingness to help others by training in empathy and relevant skills. With this in mind, Staub devised two procedures, role playing and "induction," to increase young children's willingness to help other children in distress. Four groups of children were used in the study, one with each of the procedures, one with a combination of both, and a control group.

In the *role-playing* group, pairs of kindergarten youngsters were asked to act out situations in which one of them needed help and the other provided it. The experimenter began by describing a situation in which help was needed. The "helper" child was asked to improvise all of the helping actions he or she could think of; then the experimenter described further ones, each of which was in fact acted out. Finally, the two children changed roles. The five situations that Staub used were: (1) a child had fallen off a chair in an adjoining room; (2) a child was trying to carry a chair that was too heavy; (3) a child was distressed because building blocks were taken away by another youngster; (4) a child was standing in the path of an oncoming bicycle; and (5) a child had fallen and had been hurt. The variety of possible ways of helping, generated spontaneously by the youngsters or suggested by the experimenter, included direct intervention, verbal consolation to the victim, and calling someone else for help.

Staub's *induction* group closely followed the procedures for role playing except that the children were asked merely to describe verbally how they could provide help. Then, as in the role-playing group, the experimenter described other appropriate ways of helping and pointed out the positive consequences each of these would have for the needy child, such as an increase in positive feelings or reduction of pain and suffering. Induction, then, involved pointing out to children the consequences of their behavior for others. (It had been shown [correlationally] in previous research that children whose parents described themselves as using induction techniques tend to show somewhat more frequent prosocial acts in nursery schools than children whose parents use other socialization practices.)

In the *role playing with induction* group children were trained using both procedures. In addition to actually acting out various helping roles, the experimenter explained the positive consequences that would accrue to the needy child.

Finally, there was a control group of children who acted out a variety of scenes that were completely unrelated to helping behavior.

To determine the immediate effects of these treatments, each child in the experiment was taken to a room containing a variety of toys and playthings. After brief interaction with the child, the experimenter went into the adjacent room "to check on a girl who is playing there" and then announced that she (the experimenter) would have to leave for a while. Less than two minutes after the experimenter left, the subject heard a loud crash coming from the adjacent room, quickly followed by about seventy seconds of severe crying and sobbing. Actually the room was empty and the distress sounds were produced by a pretaped recording. From the subject's point of view, though, another child, alone in the next room, desperately needed help and there was no one else to provide it. What would the subject do now?

Staub categorized the children's reactions as: *active help*, if they went into the adjacent room to help; *volunteering information*, if they reported to the experimenter that something had happened in the other room; and *no help*, if they made no effort to provide direct or indirect assistance.*

The test situation described above closely followed portions of the role-playing and induction procedures used during training. It was therefore of interest to determine whether any effects obtained would generalize to situations that were somewhat different from those involved in training. So Staub created a second test in which the subject and an adult experimenter began to play a game, during which time the adult "accidentally" dropped a box of paper clips. She then expressed mild alarm ("Oh, my dear!") and began to pick up the scattered clips. The measure during this circumstance was the number of paper clips the subject picked up, both spontaneously and with prompting (e.g., "Could you help me a little?").

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*Of course, in such situations it is important to "debrief" the child afterward, so as to explain the situation and make sure that he or she does not leave with any negative feelings or misconceptions. Thus, Staub told his subjects ". . . that they had only heard a recording, that no one was really hurt, and that the reason they heard the recording was that [the experimenter] wanted to find out what children thought when they heard another child crying. . . . So that [the children] would have an overall pleasant experience, they engaged in additional activities, for example, making up stories about pictures of pleasant content . . ." (Staub, 1971, p. 809).

Finally, there was a measure of willingness to share. Later in the sequence each child was given a bag of candy and told that there was a poor child to whom some of the candy could be donated. Thus, in sum, Staub's experiment involved a total of three measures of prosocial behavior—assisting a child in distress, assisting an adult in distress, and sharing with another child. Some of these tests were given immediately after the induction and/or role-playing treatment and others were given about one week later.

Staub's results suggested generally that role playing could be used effectively to foster prosocial behavior and that its effects were durable over a period of at least one week. The findings were therefore encouraging in that they suggested, as Staub points out in his own conclusion, "that specific training procedures, particularly role playing of specific situations, may enhance the subsequent probability of prosocial behavior" (p. 815).

However, it is of considerable interest that the effects of induction were insignificant. Indeed, inspection of Staub's results reveals that induction may actually have made children somewhat "oppositional"; those exposed to this treatment became somewhat *less* likely to assist the adult in picking up paper clips than were children in the control group. The pressure applied by induction to "be good" apparently created some threat to the child's feeling of freedom, to which he or she responded with resistance.

SHARING

Through fate or circumstance, one person is often dependent upon another's charity; indeed, whole institutions in our society are sustained by the voluntary contributions of others. As James Bryan, an expert in the area, has written: "Most children in middle childhood will verbally, if not behaviorally, support the principle that one should aid the needy" (1970, p. 61).

In this section we shall describe some of the research that supports Bryan's statement and ask how a child's willingness to share with others is acquired and maintained. Before doing so, however, it is important to distinguish between *sharing*, the act of giving some or all of one's own goods and resources to another, and *altruism*, which is usually viewed as unselfish action not motivated by self-interest.

Whether or not a child will share can be measured easily—for example, by seeing whether he or she divides a piece of cake with a peer or contributes valuable tokens, money, or toys to others in a controlled situation. But determining whether a child is acting "altruistically" is quite a different matter, inasmuch as altruism implies that the motivation of self-gain is not involved. Certainly it has been observed that children will share even if no adult is around to make them do so, and sharing also occurs even when there is no apparent opportunity for the person helped to reciprocate or even identify the donor. Still, there might be the expectation for delayed or subtle rewards; we do know that children are more likely to share when the arrangement is reciprocal—a sort of "You share with me and I'll share with you"—than when it is not (Floyd, 1964; Staub and Sherk, 1970). Then, too, sharing might occur to avoid possible negative outcomes rather than to produce positive ones. Any of these alternative explanations may plausibly rival the interpretation that children have shared for strictly "altruistic" reasons in any given situation.

Developmental trends In general, a positive relationship between age and children's willingness to share with others has been found; older children are more likely to share or appear to be more generous than younger ones (Ugurel-Semin, 1952; Handlon and Gross, 1959). In some areas, though, the relationship between age and generosity is less clear. Liebert, Fernandez, and Gill (1969) found no differences between six- to eight-year-olds and nine- to eleven-year-olds on willingness to share with another child who was described as "not well-liked and has no friends," with the younger children actually tending to be more generous than the older ones. With adult subjects the age-altruism relationship similarly may be reversed; thus, for example, young adults are proportionally more likely than older ones to be blood donors (London and Hemphill, 1965).

Mood and emotional state Several studies show that a child's willingness to share is influenced by her or his immediate emotional state. Children who are asked to think happy thoughts share more than those not given this positive set, whereas those asked to think sad thoughts tend to share a bit less than uninstructed control children also invited to share (Moore, Underwood, and Rosenhan, 1973). Related investigations also show that the feeling or experience of being successful seems to produce a "warm glow of success" in children that makes them more generous, whereas failure and its associated feelings decrease generosity in young and old alike (Berkowitz and Connor, 1966; Isen, Horn, and Rosenhan, 1973). And, finally, sharing seems to *produce* positive emotional feelings in donors, apparently because children respond with empathy to the positive experiences of those with whom they share (Aronfreed, 1968).

Effects of reward and punishment Perhaps the most obvious way to elicit sharing from children is to reward them directly for acts of generosity. After doing just this with four-year-old children, Fischer (1963) found that youngsters became more likely to share marbles with unknown peers if such beneficence was, in turn, directly rewarded with bubble gum. The brighter children in this study learned to share at a more rapid rate than the less intelligent ones, a result consistent with correlational data showing a significant relationship between intelligence and the development of a moral code in adolescence (Havighurst and Taba, 1949).

There is also the other side of the coin. One would expect that aversive consequences (punishment) for not sharing would also increase a child's sharing in the future. Until very recently developmental psychologists have given little attention to this possibility. But we now know that the threat of punishment for stinginess does increase immediate sharing. Studies have shown that such "help or else" training is extremely effective in transmitting a tendency to share (which often endures even after the threatening conditions are removed). In contrast, merely accentuating the inequity between potential donors and recipients has little effect on children's subsequent sharing (Hartmann, Gelfand, Smith, Paul, Cromer, and Lebenta, 1974; Hartmann, Gelfand, Smith, Paul, Page, and Lebenta, 1976).

There appear to be limits, however, as to the effectiveness of coercion in teaching children to share. In an important experiment, White (1972) simulated a contrast among three training techniques that parents might use to teach sharing. *Guided rehearsal* involved being told during a training session, "What we would like you to do is give one [gift certificate] to the orphans each time you win two," and then being made to follow through on this precept after having in fact won two certificates. Other children were exposed to modeled examples of voluntary sharing, sometimes with an opportunity to rehearse what they would do but always without coercion. A final, control group received no training. At least for these elementary school boys and girls, observation with unguided rehearsal opportunities was the most successful technique overall; exposure to it facilitated sharing and inhibited

FIGURE 11–5
Sharing is often learned by observing others. Photo by Shumsky.

stealing of the freely available certificates. The pressure of forced rehearsal did have the immediate effect of guiding the children to increase their donations, even when they were alone, but in the long run forcing sharing in this way led to both *decreased* sharing and increased stealing relative to the other groups.

The powerful effects of behavioral example In White's (1972) experiment, discussed above, the combination of a modeled example and voluntary rehearsal was a highly effective long-term training technique for sharing. This should not be surprising, for literally dozens of studies with children had shown previously that behavioral examples are perhaps the most potent way to elicit and teach sharing (Bryan and London, 1970; Poulos and Liebert, 1972). In an earlier study, for example, Rosenhan and White (1967) asked fourth- and fifth-grade boys and girls to play a bowling game in which gift certificates, exchangeable at a local toy store, could be won. The experimenters varied a number of factors, one of which was whether the children saw an adult model donate to the "Trenton Orphans Fund" by placing some of his gift certificates in a labeled box which displayed children in ragged attire. Of those who saw this altruistic example, almost half (47.5 percent) also shared later when they were all alone; in contrast, without the instigation of a generous adult exemplar, none of the children shared. Experimental studies such as these seem to be confirmed by field data as well. One correlational study found parents' altruistic values (presumably modeled for their children) to be the single most consistent predictor of altruism in the child (Hoffman, 1973).

That exposure to sharing models can increase children's sharing has been clear for some time, but the model characteristics that can amplify or mute this effect have been studied only more recently. Grusec (1971), for example, found that children were more likely, when alone, to imitate the sharing of a powerful model (an adult who controlled resources of great value to the child) than a nonpowerful one. In contrast, a sharing model who was extremely warm, friendly, and rather forgiving was actually imitated somewhat less than a sharing adult who had maintained a more neutral demeanor. An overly tolerant and forgiving parent may simply have a more difficult time in transmitting any form of self-denial, including sharing.

AGGRESSION

At some time or another virtually everyone aggresses, acting in a way that brings, or might bring, discomfort to someone else. We know, however, that the type of aggression that a person displays and the ability to control such action change in important ways with age and experience. The roots of these patterns and changes have long been of interest to developmental psychologists.

For our purposes the determinants of aggression can be divided into two broad classes. Certain kinds of circumstances will draw out aggression more often than others and may therefore be thought of as *elicitors* of aggression. When people are attacked, for example, they are likely to respond in kind, and so attack is an elicitor of aggression. Other determinants of aggression do not deal with provocation, but rather teach or encourage aggression, as *cultivators* of a general pattern of responding.

ELICITORS OF AGGRESSION

Frustration

One view of how aggression is elicited is found in the famous "frustration-aggression" hypothesis, first spelled out by John Dollard and his associates at Yale in 1939. These theorists argued that *frustration*, defined as any blocking of goal-directed activity, naturally leads to aggression. The original statement of this hypothesis was extremely strong: aggression was said to be *always* a consequence of frustration and frustration was said to lead *always* to some form of aggression. At first glance, this hypothesis may appear intuitively rather persuasive. But in many cases most people, even if severely frustrated, will refrain from showing any direct acts of aggression; speeding drivers will not assault, or even raise their voices to the policeman who has apprehended them. And, as we shall see, factors other than frustration often lead to the occurrence of aggression.

Emotional arousal

Many parents feel that their children are more likely to become aggressive (hitting a younger brother or sister, for example) when they are upset, agitated, or excited. Research has shown that emotional arousal does appear to influence a child's willingness to aggress and that the process may operate differently according to the youngster's sex. Boys' overall level of aggression increases when they are emotionally aroused, whereas arousal has been found to decrease aggressive behavior in girls (Harris and Siebel, 1976). Socially learned anxiety about hostile impulses may well account for the pattern, inasmuch as females are taught to feel guilty about their aggressive tendencies while males are often led to believe that a willingness to aggress is brave or heroic.

At one time it was thought that most people could reduce their level of arousal by playing out their aggressive feelings verbally. But research has now shown that this type of *catharsis* does not occur.* Neither children nor adults seem able to "let off steam" by verbally expressing their hostilities (Mallick and McCandless, 1966; Loew, 1967), and permitting a child to speak aggressive words has been shown, for both boys and girls, to *increase* one's willingness to punch another child (Slaby, 1975).

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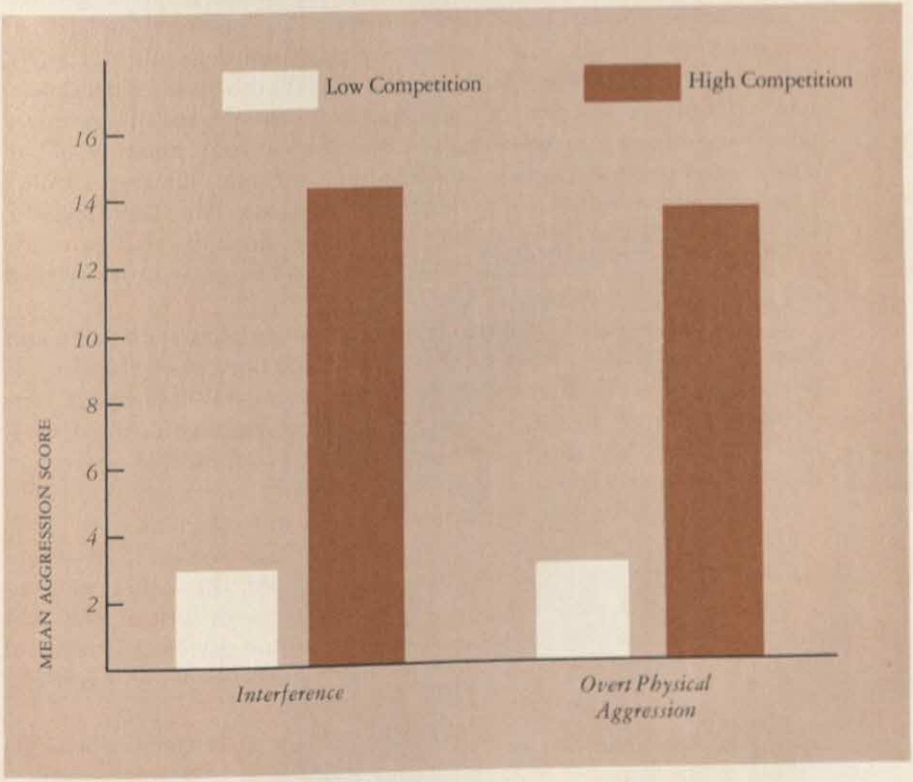
*The term *catharsis* can be traced to Aristotle, who believed that an audience could be drained of tragic emotions by watching a play. Freud later used the concept to refer to the release of pent-up or repressed feelings.

Competition Do highly competitive situations produce only sporting gamesmanship in children, or can they elicit outright hostility as well? This question was asked in a field experiment conducted by Rocha and Rogers (1976). In their study pairs of kindergarten and first-grade boys competed for a prize by building a tall tower out of blocks. In the high-competition group, few blocks were available; whereas in the low-competition group, blocks were available in abundance. The results clearly showed that high competition bred aggression as measured by interfering with one's partner and taking some of his blocks; more distressing was the fact that boys in the high-competition group often abandoned the relatively practical if distasteful tactics of interference (for example, toppling the other boy's blocks) in favor of out-and-out physical assaults against the opponent. Figure 11-6 indicates that physical aggression was stimulated as much as was interference by introducing the element of high competition into the game. As the authors note:

> The results of the present experiment clearly supported the hypothesis that competition breeds aggression. Regardless of how aggression was measured, the more competitive the situation, the more aggressively the

FIGURE 11–6
Results of Rocha and Rogers's experiment, showing that competitive situations may elicit overt physical aggression between children, as well as encouraging interference with the other child's efforts.



> children behaved. . . . It was particularly distressing to discover that [competition] affected physical aggression as well as interference. Toppling the opponent's tower was at least as effective as fighting as an instrumentality to winning the prize, and perhaps a better method since the subject's own tower could be tumbled inadvertently in a brawl. [These and other findings suggest] that competitive situations frequently arouse feelings of rivalry that go beyond merely winning the competition and involve going out of one's way to hurt the other person.

SOCIAL LEARNING OF AGGRESSIVE BEHAVIOR

Although children may be provoked into aggression by irritating or arousing events in their environment, most aggressive acts also have a basis in the child's past learning history. Youngsters who have been taught that reward usually follows aggressive behavior or who have been given numerous aggressive models will learn habits that can easily be activated whenever provoking circumstances occur.

In a series of experiments done some years ago, Richard Walters and his associates demonstrated that even rewarding children for "make-believe" aggression in a play situation increases later aggressiveness against other children (Cowan and Walters, 1963; Walters and Brown, 1963, 1964). In the Walters and Brown (1963) experiment, for example, colored marbles were given as rewards to some children, on either a continuous or an intermittent schedule, for hitting a toy Bobo doll similar to the one in Figure 11-7. Children in a control group did not receive these rewards. Two days later the children were put in a potentially frustrating situation and were left to play with another child, who had not received any training in aggression. The degree of aggressive behavior displayed in this situation was the primary measure of the study. The behaviors rated included butting, kneeing, elbowing, kicking, punching and pushing, and pulling by the neck and hair. Children who had been rewarded intermittently for hitting the Bobo doll two days earlier showed significantly more aggression in this game situation than did either of the remaining groups.*

In a second experiment by these same investigators (Walters and Brown, 1964) some participants were rewarded only when they hit the Bobo sharply while others were rewarded exclusively for weaker hits. Again, employing measures of aggression in physical contact games, it was found that boys rewarded for the higher magnitude of aggression were more aggressive in this new interpersonal situation than were those who had been rewarded for relatively temperate play.

The studies of Walters and Brown have several striking implications for socialization practices. Consider, for example, the father who enthusiastically encourages his son to roughneck with him in play and smash away at punching bags, praising the lad for particularly forceful assaults. In addition to building a "real boy," it may be that such training has the unintended effect of promoting aggression in other interpersonal situations. Additionally it should be noted that intermittent reinforcement, which had the greatest effect on children in the Walters experiments, is the very type that parents are likely to provide, inasmuch as they will not be present at, and certainly not attentive to, all of the child's aggressive actions.

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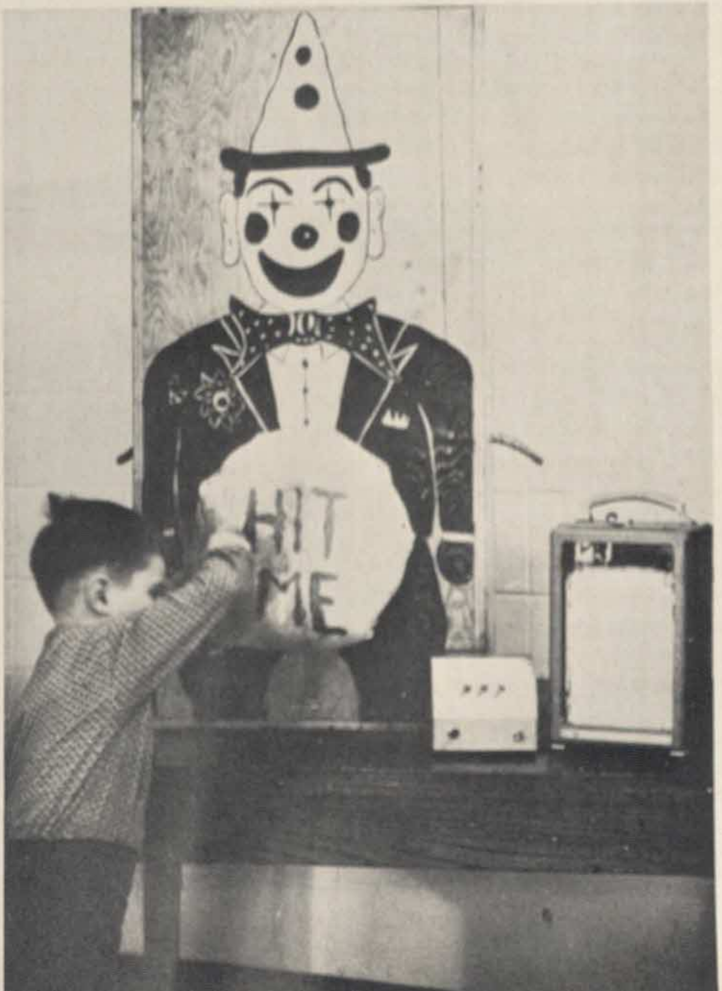
*The effect of rewarding children intermittently rather than continuously was discussed in Chapter 6.

The role of modeling in the acquisition of aggressive skills and habits was discussed briefly in Chapter 6. We saw that children can learn novel ways of behaving aggressively merely by watching the performance of these acts by others, and that this learning takes place even if the aggressive model is punished for acting out hostilities. More importantly, continual exposure to multiple models who act in a particular way (e.g., aggressively) may induce a general disinhibition so that, beyond imitating particular actions, a widespread tendency to respond aggressively to new situations may develop. It has now been shown that these same principles apply to televised models of aggression, and the findings have raised serious questions about violence on children's television.

FIGURE 11–7
The "Bobo" doll used for studying the influence of reward on aggressive behavior in the Walters experiments. From Bandura and Walters, 1963. Courtesy Dr. Albert Bandura.



EXTENDED DISCUSSION

TELEVISION AND CHILDREN'S AGGRESSIVE BEHAVIOR

What are the effects upon children of observing violent television programs? The question is one that has been posed continually since the advent of television sets as a common fixture in the American home over two decades ago. Answers to it have ranged from statements that such programs can have an adverse effect on almost anyone to assertions that merely watching entertainment fare can do little to shape children's social behavior.

Early studies by Bandura and his associates showed clearly that youngsters could *learn* novel aggressive responses from television and televisionlike formats. But critics (Halloran, 1964; Klapper, 1968) pointed out that these studies did not prove that the kind of violence found on television or in movies influences the "real-life" social behavior of young observers. In response to the critics, researchers began to ask whether children also would imitate screened aggression against human victims.

In the first study directed toward the answer, four- and five-year-old boys from a Sunday School kindergarten served as subjects (Hanratty, Liebert, Morris, and Fernandez, 1969). Half of them observed a two-and-one-half-minute color sound film in which an adult aggressed against a human clown. The behavior displayed by this symbolic model included sharp and unprovoked verbal insults to the clown, shooting at the clown with a toy machine gun, and beating the clown vigorously with a plastic mallet. Half the group saw no such film.

Thereafter, half of the subjects in each of these groups were permitted to play in a room where they found a human clown standing idly, as well as a mallet and a toy gun. The remaining children found a plastic Bobo doll rather than a human. The youngsters were left in this situation for ten minutes, during which time their aggressive responses toward the clown, plastic or human, were recorded. Not surprisingly, the brief film increased children's aggression against the inflated Bobo, with *all* the children exhibiting some aggressive action against the toy. In contrast, of those who had not observed the movie, none engaged in any sort of aggressive behavior toward the human clown. There are, of course, strong inhibitions for aggressing against a human being, even one who is attired as a clown, and there was no provocation for doing so. Nonetheless, after observation of the aggressive movie a significant number of physical assaults against the human clown did occur, including at least one swat with the mallet which was hard enough that the victim showed a red mark on her arm several hours later.

In a second experiment (Hanratty, 1969), it was again found that a film of this type, without other provocation, would lead children to physically assault a human victim. Moreover, such aggression was displayed by both boys and girls after viewing films in which either an eight-year-old boy or an adult served as a model. This finding was replicated a third and a fourth time with somewhat older boys (Hanratty, O'Neal, and Sulzer, 1972; Savitsky, Rogers, Izard, and Liebert, 1971). Under some circumstances, then, children will directly imitate filmed aggression against other people.

Still, direct imitative effects require a situation virtually identical to the one observed, and so may be less important from a social point of view than a more general disinhibition (see Chapter 6). Considerable research emphasis has recently been placed on disinhibitory influences.

DISINHIBITORY EFFECTS

Several correlational studies now bear directly on the possibility of a relationship between the amount of violence a child observes and the amount of aggressive behavior displayed in naturalistic situations. Uniformly, such a relationship has been found, for both elementary (Dominick and Greenberg, 1972) and high school age youngsters (McIntyre and Teevan, 1972: McLeod, Atkin, and Chaffee, 1972). McLeod, Atkin, and Chaffee (1972), for example, examined the relationship between viewing televised violence and a variety of measures of aggressive behavior in two relatively large samples of adolescents, one in Maryland and another in Wisconsin. The authors summarized the outcome of these correlational studies as follows:

> Our research shows that among both boys and girls at two grade levels [junior high and senior high], the more the child watches violent television fare, the more aggressive he is likely to be as measured by a variety of self-report measures.... Partialing out [total] viewing time slightly reduces the positive correlations of violence viewing and aggressive behavior in most cases, but the basic result is the same as for the raw correlations.... Similarly, the partialing out of socioeconomic status and school performance does not alter the basic pattern.... We may conclude, then, that adolescents viewing high levels of violent content on television tend to have high levels of aggressive behavior, regardless of television viewing time, socioeconomic status or school performance. [pp. 187, 191]

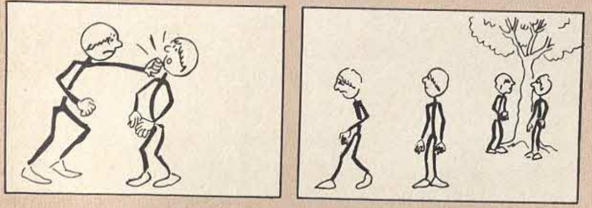
As explained in Chapter 2, correlations such as the ones described above are not firm proof of causality; aggressive behavior could be related to TV violence viewing without necessarily being caused by it. One way to increase certainty regarding such possible effects is to conduct a longitudinal study so that change (if any) can be seen directly. Lefkowitz, Eron, Walder, and Huesmann (1972) have done just that. Their report, based on a longitudinal study of the entire population of children of a particular age in a rural New York county, involved approximately nine hundred youngsters. Designed from the outset to relate children's aggressive behavior to various familial, social, and experimental factors that might influence it, these investigators employed a peer measurement technique of aggression, focusing exclusively upon acts that would harm or irritate other persons. The first measures obtained by the investigators showed a significant relationship, for boys, between the amount of television violence that the subjects watched in the third grade, when they were nine years old, and independently assessed peer ratings of how aggressive they were at that time (Eron, 1963).

Lefkowitz *et al.* completed the longitudinal phase of their study ten years later by obtaining data from more than four hundred of the youngsters whom they had studied initially. The measures included peer ratings of aggression at this age, self-reports of aggression in an interview, and self-reports of various aspects of television viewing. The results of this ten-year follow-up showed that, for boys, the amount of TV violence they watched at age nine was significantly related to how aggressive they were ten years later, at age nineteen. In fact, the strength of this relationship led the investigators to conclude that a substantial component of overt aggressive behavior at age nineteen was predicted better by the amount of television violence children watched in the third grade than by any other variable measured.

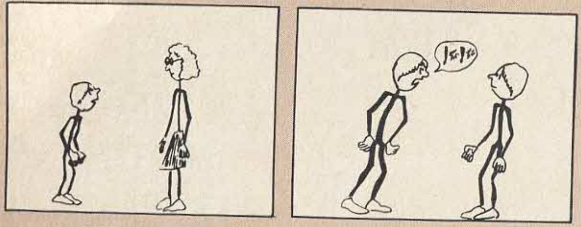
The Lefkowitz *et al.* study greatly strengthens the argument that TV violence viewing causes aggressive behavior, but only true experiments, in which the selection of programs is controlled by the researcher, can put the process to the final test. Over the past few years numerous experiments have examined the relationship between viewing entertainment violence and acting aggressively, and the overwhelming majority have found evidence that the causal connection is present (Liebert, Neale, and Davidson, 1973; Strauss and Poulos, 1972).

Leifer and Roberts (1972), for example, obtained information on the subsequent willingness of children and adolescents (kindergartners through twelfth graders) to aggress after they watched television programs which differed in the amount of violent content displayed. The programs were taken directly from the air, without editing. The children were then tested on a specially designed response hierarchy of their willingness to aggress. The child was presented with a series of real-life situa-

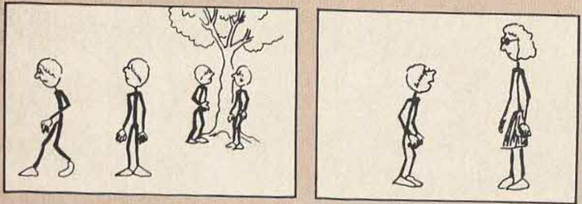
"You're walking down the street. Some kid is mad at you and comes up and hits you. What do you do?"



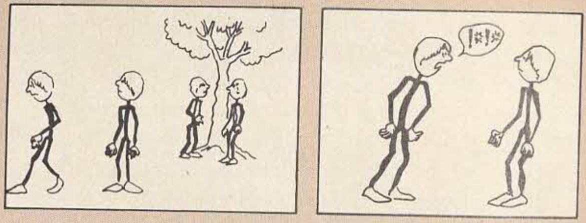
A. HIT THEM OR LEAVE THEM?



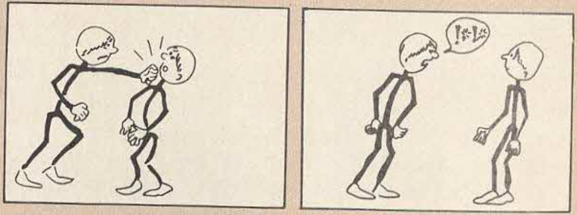
B. TELL A GROWN-UP OR CALL THEM "STUPID"?



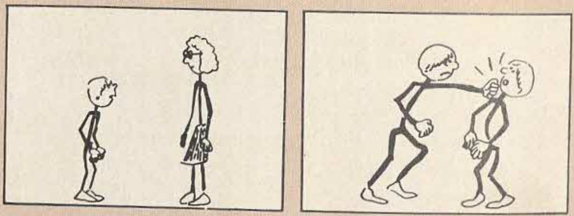
C. LEAVE THEM OR TELL A GROWN-UP?



D. LEAVE THEM OR CALL THEM "STUPID"?



E. HIT THEM OR CALL THEM "STUPID"?



F. TELL A GROWN-UP OR HIT THEM?

FIGURE 11–8
Sample items from the response hierarchy used by Leifer and Roberts. Children were shown either slides or pictures of situations such as these. From Leifer and Roberts, 1972, by permission. Artist: Jurgen Wolff.

tions ("You're standing in line for a drink of water. A kid comes along and just pushes you out of line. What do you do?") and asked to choose between a pair of alternative responses. One of the alternatives was typically aggressive ("Push them"), while the other was not ("Go away"). (See Figure 11-8.) These investigators, too, found that the more violent programs reliably produced higher levels of aggressive responding than the less violent ones. It is of further interest that in this experiment understanding the motivations for, and consequences of, violence in a program did *not* relate to a significant degree to the aggression scores. It appears that the instigating effect of viewing is not reduced by an increased understanding of the motivations and consequences that surround it.

Studies of the sort done by Leifer and Roberts provide the best source of information about basic processes and causal relationships. However, to ensure generality of such findings to the more complex natural environment, such "laboratory studies" can be supplemented by experimental field research. One such study was conducted by Stein and Friedrich (1972) in a relatively naturalistic situation in order to determine some of the cumulative or longer-range effects of observing television upon children. The subjects were ninety-seven children (fifty-two boys and forty-five girls) between 3½ and 5½ years of age, who were systematically exposed to television programs of differing content during the course of their participation in a summer nursery school.

This carefully designed experiment involved an initial measurement period in which the free play of children in the nursery school was observed and rated according to a variety of categories; a four-week experimental period in which children were systematically exposed either to aggressive cartoons (*Batman* and *Superman*), neutral television programming (children working on a farm and the like), or prosocial programming (episodes from the program *Mister Rogers' Neighborhood*); and a two-week postviewing period in which effects could be observed and assessed. The children were exposed to the programs for approximately twenty minutes per day three times a week for a four-week period. During this time, and during the two-week postviewing period, the children's behavior was again systematically observed in the naturalistic preschool situation.

Stein and Friedrich found that children who were initially in the upper half of the sample in interpersonal aggression subsequently showed greater interpersonal aggression if they were exposed to the aggressive programming than if they were exposed to either the neutral or the prosocial programming. Thus, aggressive cartoons increased interpersonal aggression significantly for these children despite the fact that they watched television in the nursery school for less than six hours of total viewing spread over four weeks. What is more, as the investigators note:

> [The] effects occurred in naturalistic behavior that was removed both in time and environmental setting from the viewing experience. They occurred with a small amount of exposure, particularly in relation to the amount the children received at home, and they endured during the postviewing period. [P. 247]

PARENTAL REACTIONS AND TV VIOLENCE

Discussions of the effects of television violence usually consider the possibility that parental reactions may reduce the medium's aggression-provoking effects. Grusec (1973) addressed herself to this issue by having five- and ten-year-old children watch an aggressive film with an adult co-observer. In one condition the adult was overtly critical of the screen aggressor (for example, by saying "That's awful" when an aggressive act occurred); in the two other conditions the adult either responded neutrally or praised the same hostilities. The critical test came when the children were permitted to play alone after having seen the film with an adult under one of these three conditions.

As we might have expected, ten-year-olds who had seen the film with an adult critical of aggression were indeed subsequently less aggressive than their peers who had viewed the film with an accepting or openly approving adult co-viewer. More surprising was the behavior of the five-year-olds, who imitated the film's aggressive examples when they were alone regardless of what the adult's stated opinions had been when they had watched together. What is more, there would have been no way for the adult to find out that her criticism had failed to neutralize the film had this not been an experiment. We know this because for all children there was a final phase to Grusec's experiment; now a new adult appeared and asked the child about each aggressive scene in the film. In this interview situation five-year-olds as well as ten-year-olds were highly critical of the film if they had viewed it originally with a critical adult—considerably more critical than in the other groups. Publicly, then, the five-year-olds seemed to reject the criticized behaviors of the aggressive model, while privately they were imitating most of them.

SEX ROLES AND SOCIALIZATION

A child's gender plays an important role in psychological and social development throughout the entire life span. Well before school age most children recognize their own sexual identity and have knowledge of the social concepts *male* and *female* (Kohlberg, 1966). Obviously, that there exist many differences between the sexes is a biological as well as a social fact. But just how extensive are the differences between the sexes?

THE EXTENT OF SEX DIFFERENCES

Throughout most of the life span, males are typically stronger and larger than females, and they display a better-developed musculature. Females, on the other hand, have a lower mortality rate and are less susceptible to diseases both at birth and throughout the remainder of their lives (Hetherington, 1970).

It is also firmly established that females are superior to males in verbal ability. A few studies (e.g., Lewis and Freedle, 1972; Clarke-Stewart, 1973) have reported an advantage for female children in verbally related skills during the first two years of life. The differences remain relatively small, however, until adolescence when the sexes begin to diverge sharply; female superiority in verbal skills increases in the high school years and possibly beyond (Maccoby and Jacklin, 1974). Although girls seem favored in terms of verbal ability, the evidence is equally clear that males are superior in visual-spatial ability and in the ability to deal with mathematical, quantitative concepts. Again the real separation between the sexes appears at about twelve or thirteen years of age and continues into adulthood.

When it comes to social behavior, the picture is much less clear. In a book that has become the definitive examination of sex differences, Maccoby and Jacklin (1974) have concluded that many presumed social differences between the sexes are actually cultural myths, with no basis in reality. Some of these unfounded opinions, as well as the corresponding research facts, are listed in Table 11-1. The table shows that, contrary to common belief, girls are *not* more social than boys, nor do they have lower self-esteem or achievement motivation. These "differences," and others listed in the table, are actually false impressions or mythical views held by society. At the same time, sex differences in aggression seem present in almost all societies and have been clearly observed in our own culture from the time children are about two years of age.

An intriguing question, of course, is whether the legitimate differences that have been observed between the sexes are primarily biologically or socially based. It is reasonable to assume that the sex chromosomes may influence many dispositions beyond the character-

TABLE 11-1
FOUR EXPLODED MYTHS ABOUT SEX DIFFERENCES

MYTH	FACTS
Girls are more "social" than boys.	*FALSE.* Research shows that girls are *not* more dependent on caretakers than boys, nor are they more responsive to social rewards. At some ages, boys actually spend *more* time than girls with their playmates.
Girls are more "suggestible" than boys.	*FALSE.* Most studies show no sex differences here, and a few have shown that boys rather than girls are more likely to give in to peer group pressures which contradict their own values.
Girls lack achievement motivation.	*FALSE.* Under neutral conditions, girls regularly score higher than boys on measures of achievement motivation. When challenged or put in a competitive situation, the achievement motivation of boys is increased, but only to the level girls have already reached.
Girls are more affected by heredity; boys are more responsive to the environment.	*FALSE.* Male identical twins are actually *more* alike than female identical twins. Males are more susceptible to certain types of environmental stress than females but they are not more likely than girls to be influenced by positive environmental factors.

Source: From the summary reported by Maccoby and Jacklin (1974).

istics that are explicitly sex characteristics. But we know that there is considerable overlap between males and females on all the behaviors and abilities that we have discussed. Many women have become accomplished mathematicians, whereas men have frequently excelled in drama, oratory, and serious fiction—all of which involve high levels of verbal ability. While such overlap may reflect a range of biological capacities, it no doubt also indicates socialization influences, the impact of which is strikingly shown in cross-cultural studies.

Consider, for example, a report of three tribes that differed among themselves on the expression of aggression by the sexes. The study, reported years ago by Margaret Mead (1935), revealed that all combinations of sex-role aggression are possible. The Arapesh, one of the tribes studied by Mead, expect both males and females to behave in ways that would be considered passive and feminine in Western cultures—both sexes are taught to be cooperative and responsive to the needs of others. Among the Mundugumor, in contrast, members of both sexes are expected to act in a way that would be considered almost a stereotype of masculinity by our standards—both men and women are expected to be ruthless and aggressive, and to be unresponsive emotionally in their relationships with others. The third tribe described by Mead, the Tchambuli, shows a pattern of sex-role expectations that is directly opposite to that familiar in Western European and Anglo-Saxon countries—the women are expected to be aggressive and dominant, while their male counterparts are passive and emotionally dependent.

Apparently, then, it is the interplay of biological and social factors that accounts for many behavioral sex differences. One writer, Eleanor Maccoby (1966), put it this way:

> . . . the sex-typed attributes of personality and temperament . . . are the product of the interweaving of differential social demands within certain biological determinants that help produce or augment differential cultural demands upon the two sexes. The biological underpinnings . . . set modal tendencies for cultural demands, and set limits to the range of variation of these demands from one cultural setting to another. Still within these limits considerable variation does occur between families, between cultures and in the nature of the behavior that a social group stereotypes as "feminine" or "masculine." [P. 50]

SEX-ROLE LEARNING AND DEVELOPMENT

Because so many cross-cultural differences exist between the sexes, it seems likely that many of the behavioral differences we observe between boys and girls and between men and women express sex roles that have been learned rather than biological differences that are fixed by nature. With this possibility in mind, developmentalists have become very interested in the course of sex-role development and in factors that may alter it within our own culture.

Cognitive factors

If sex differences in behavior are learned rather than innate, the emergence of these differences will depend on the child's ability to understand the concept of gender. Based on a converging body of evidence, Slaby and Frey (1975) have suggested that the child's concept of gender, the cognitive underpinning of sex-role learning, develops in three ordered steps during the preschool years:

1. *Gender identity.* The child recognizes that he or she is either male or female.
2. *Gender stability.* The child recognizes that boys invariably become men and girls become women.
3. *Gender consistency.* The child recognizes that the attribute of being either female or male will not change with changing situations and personal motivations.

This progression closely follows what we know of the more general pattern of cognitive development, and the idea of gender stability may just be a special case of acquiring the concept of object constancy, as discussed in Chapter 7. Likewise, a complete grasp of the permanence of gender consistency is not unlike the more general process of recognizing the conservation of properties of the physical universe, and, in fact, children's ability to recognize gender constancy across situations has been shown to be related to their mastery of the concept of conservation (DeVries, 1974).

Early social factors Gender identity, the first step in Slaby and Frey's suggested developmental sequence, is quite probably taught from birth, and social inputs suggesting the importance of whether the child is male or female have traditionally been emphasized throughout the years of childhood and adolescence.

A striking example of the early recognition of "appropriate" sex roles in children was offered by a four-year-old girl who was avidly watching a television program about physicians. The child's interest was so high that she was asked, "Do you think *you* want to be a doctor when you grow up?" The immediate reply was, "No, I can't be a doctor, *I'm a girl.* Only boys can be doctors." The origins of this child's remark are obviously social rather than biological, and the fact that they are present so early should not surprise us. As Bandura (1969) has cogently noted:

> Sex-role differentiation usually commences immediately after birth when the baby is named and both the infant and the nursery are given the blue or pink treatment depending upon the sex of the child. Thereafter, indoctrination into masculinity and femininity is diligently promulgated by adorning children with distinctive clothes and hair styles, selecting sex-appropriate play materials and recreational activities, promoting associations with same-sex playmates, and through nonpermissive parental reactions to deviant sex-role behavior. . . . [P. 215]

Selective attention to same-sexed models Once a sense of gender constancy has been established and children have been differentially rewarded for performing expected sex-role behaviors, another interaction of cognitive and social processes comes into play. Specifically, children begin to attend selectively to the behavior of persons of their own sex. Grusec and Brinker (1972), for example, found that five- and seven-year-old boys and girls, shown movies of male and female adults performing simple actions, are better able to remember the behavior of the performer of their own sex—apparently because they were rewarded for some sex imitation in the past. The investigators point to the following intriguing implications of their findings:

> While boys at an early age may even be equally familiar with the behaviors displayed by both their mothers and fathers, as they grow older and are

> exposed to more and more direct training for masculine behavior, they may come to be less familiar with the behaviors that females in our culture display. When they grow up they may be unskilled at sweeping, dusting, and making beds not just because they have not had practice in doing these things, but because they have never really concentrated too closely on how they are done. [P. 155]

Slaby and Frey (1975) have found that this selective attention is already present during the preschool years and that it increases as the child's understanding of gender constancy increases. It is almost as if the child is saying: "Now that I know I'm going to be a girl [or boy] permanently, it will pay for me to watch closely and see how other girls and women [or boys and men] act".

Development of sex-role preferences In a general way, most children come to express a preference for the roles and activities usually associated with their own sex. This process is closely related to the differential attention we have just mentioned, and, of course, it too is probably influenced strongly by the rewards, punishments, and examples provided by various agents of socialization. It is as if children are taught to believe that it is normal or expected that they prefer the activities usual for their sex. First-graders will choose one toy over another (for example, a cow puzzle over a horse puzzle or a robot over a "Frisbee") if they have been told that members of their own sex prefer it (Liebert, McCall, and Hanratty, 1971).

On other measures, too, preference for one's own sex appears to be something that children feel is normal or expected. Hartley, Hardesty, and Gorfein (1962) found from individual interviews that children believe adults prefer children of their own sex, that is, that men prefer boys and women prefer girls. As if following their elders, a same sex preference also shows up in the children's own inclinations. Even nursery school children rank same-sex peers positively and opposite-sex peers negatively across a range of circumstances (Moore and Updergraff, 1964), and elementary school children express a preference for playing with adults of their own sex (Stevenson, Hale, Hill, and Moely, 1967). In view of these findings, it should not be surprising that boys imitate their fathers more than their mothers (Hetherington and Frankie, 1967) or that children are more likely to imitate "sex-inappropriate" behavior if it is modeled by a same-sex peer than by an opposite-sex one (Wolf, 1973).

Despite this general pattern, though, female children and adults are more likely to favor masculine social and occupational roles than males are to prefer feminine ones (e.g., Fortune, 1946; Gallup, 1955; Brown, 1957). It is unclear whether this is the result of society valuing masculine roles more than female roles, of masculine roles being inherently more desirable, or of both these factors.

Variability in sex-role development The general principles we have outlined should in no way suggest that sex-role development is uniform or that it is uniformly clear among all children. In fact, research has shown convincingly that numerous family and personal factors come into play in determining the degree to which any one child's personality or behavior is sex-typed. Rosenberg and Sutton-Smith (1968), for example, found that sex-role preferences vary as a complex interaction of the family structure; sibling affects sibling and children affect their parents' sex-role behavior just as parents influence their children. Fathers, for example, are *less* feminine in girl-girl families than in girl-boy families, and a boy with two sisters expresses more masculinity than a boy with only one (Rosenberg and Sutton-Smith, 1964). Additionally, more characteristics typical of the opposite sex are found in children coming from cross-sex sibling pairs (one boy and one girl) than in children coming from same-sex pairs (Yarrow and Yarrow, 1964), a finding that accords well with an observational learning theory of sex-role development. And, perhaps most interesting, one study (Minuchin, 1965) found that girls from home environments that emphasized individuality were less likely to display and adhere to conventional sex-role standards than were girls who came from relatively traditional backgrounds.

SUMMARY

Socialization involves complex interactions between the child and various agents of socialization: parents, siblings, peers, school, church, and mass media. Learning is considered critical to the development of interpersonal reactions, such as prosocial behavior, aggression, and sex-role behavior.

Prosocial behavior includes cooperation, helping, and sharing. Although these actions generally serve society well, they can also benefit the individual performing them. Contrary to what we might expect, cooperation does not necessarily increase with age. In situations requiring cooperation for success of the individuals, younger children sometimes demonstrate more cooperation than do older ones. Apparently some situations elicit competition in older children that precludes their acting cooperatively. This effect appears stronger in boys than in girls but operates across social class and for both black and white children. In some cultures (e.g., Mexico and the kibbutzim), children are more cooperative than U.S. children, but even here we find that urban settings foster competition. Cooperation can be stimulated, however, by directly reinforcing it, by structuring the situation as a "we" rather than an "I" situation, by exposing children to the benefits of cooperation, and by presenting cooperative models.

Psychologists have addressed themselves to the question of how helping can be elicited or encouraged in children. Exposure to peer models who act out helping in different situations increases subsequent prosocial behavior. Induction, involving pointing out the consequences of helping, apparently does not always increase prosocial behavior. Being "pressured" by verbal lessons to be "good" can have adverse effects in that it makes children oppositional.

Children's willingness to share their possessions with others clearly increases with age. However, many factors are known to influence sharing: emotional state of the potential sharer, reinforcement for sharing, exposure to a powerful model. Forcing children to share is not especially effective; children treated in this manner do not have a strong tendency to share unless they are being watched by others.

Aggression can be provoked by frustration, emotional arousal, and competition. Reinforcement for aggression and exposure to aggressive models are powerful in encouraging such action in children. Extensive investigation of the effects of television aggression has clearly shown that televised models can increase aggression in children. This conclusion is based on correlational and experimental studies and holds across a wide range of children. Parents can modify this effect somewhat by being critical of the screened aggression. However, such criticism does not seem influential for pre-schoolers; they continue to accept aggression as a way of behaving when they are not with the adult who had been critical.

The socialization of sex-role behavior has broad implications for individuals throughout their entire life span. The two questions most frequently asked with regard to sex roles involve (1) the extent of differences between the sexes and (2) the origins of such differences. The sexes show some differences in body size, strength, and susceptibility to disease. Females demonstrate superior verbal ability, whereas males are superior in visual-spatial and mathematical ability. Aggression is more prevalent in males in many cultures, but differences in other social behaviors (e.g., suggestibility, sociability) are negligible or nonexistent. Although some sex differences obviously are biologically based, social behavior is largely learned. Cross-cultural research provides strong examples of cultures that shape sex roles in ways that are opposite from those that we would consider typical for the sexes. Children learn very early that they are male or female, and that gender is stable. They then pay particular attention to same-sex models, develop a preference for the activities and roles associated with their own sex, and imitate same-sex models more than they do opposite-sex models. Within the complexity of family interaction, reinforcement undoubtedly strengthens these behaviors.

Self-Control, Achievement, and Moral Values

CHAPTER 12

OUTLINE

- SELF-CONTROL
  - Resistance to Temptation
  - Discipline and Resistance to Temptation
  - Combining Reasoning and Punishment
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- SUMMARY

Childhood behavior is channeled to a large extent by numerous immediate external constraints: the expectations of others, parental rewards and punishments, and peer pressures, to name a few. Sometimes, however, children behave "appropriately" with seemingly little influence from extrinsic sources. They may, for example, continue to obey rules that have been enforced previously by parents; they may decide, even when alone, to ignore the gratification of immediate rewards in favor of long-range goals; they may impose relatively high achievement standards on themselves; or they may "do the right thing" by another person when faced with a moral dilemma.

In this chapter we discuss three closely related aspects of the child's development of a personal value system: self-control, achievement strivings, and moral judgment. Each of these areas involves a self-imposed standard of some sort, and each involves and is influenced by the basic processes of learning and cognitive development with which you are by now quite familiar.

SELF-CONTROL

Self-control, as we will use the term, refers to behavior in which the child monitors his or her own actions in some way in the absence of, or in contradiction to, pressures in the immediate situation. Discussion will revolve around three related aspects of self-control: the ability to "resist temptation," the ability to tolerate "delay of gratification," and the imposing of standards of achievement upon oneself. It will become evident that these behaviors are closely associated with the once popular notion of "will power" and with the concepts of morality and justice as well.

RESISTANCE TO TEMPTATION

In its broad definition, *resistance to temptation* refers to refraining from the opportunity to engage in a socially prohibited but otherwise tempting act, such as cheating on a difficult exam or stealing someone else's property. The idea of resistance to temptation differs from other related forms of self-control in that the emphasis is on whether the child will adhere to or deviate from an established rule. For this reason, the term *resistance to deviation* is preferred by some writers.

FIGURE 12–1
An important aspect of self-control is learning to resist temptation. Mimi Forsyth, Monkmeyer.

In the laboratory, resistance to temptation has been studied mostly in situations that provide the child with a private opportunity to cheat on a game or to engage in an explicitly forbidden act (i.e., to deviate from the norm of honesty or break a stated rule). Those who deviate are compared in a variety of ways with those who do not deviate. One of the most central questions asked has been, "How do youngsters learn to restrain themselves from what they want to do but know they should not do?" Attention has focused on the role of parental discipline in shaping this behavior.

DISCIPLINE AND RESISTANCE TO TEMPTATION

Burton, Maccoby, and Allinsmith (1961) measured the tendency of four-year-olds, both boys and girls, to resist the temptation to break a rule in the light of the child-rearing methods reported by their mothers. To determine the kinds of discipline to which each child had been exposed, the child's mother was interviewed intensively for about two hours. To assess tendencies to violate or adhere to a stated rule, each child was introduced to a beanbag game, told the rules clearly, and left to play the game alone. The object of the game, as explained to the child, was to hit a wire stretched behind a board in which five lights were displayed in a row. Hitting the wire, it was explained, would turn one of the lights on, and each time this happened a bell signaling the success would ring. Players were to throw each of five bags over the board while standing behind a foot marker approximately five feet from the board; crossing the marker so as to be closer to the target would be a direct violation of the rules of the game in this situation. Before actually playing alone, each child was asked to select from an attractive array the toy he or she would like to win by getting "enough lights to win a prize."

Actually, however, the game was completely controlled by a hidden experimenter who not only made sure that everyone received the same score but also monitored and recorded each child's behavior. (Controlling the scores in this way was necessary so that the temptation to cheat would not be related to possible differences in the children's throwing ability.) Also built into the situation was a special incentive to cheat; although only one light could be earned honestly, additional ones might be sought by stepping forward, moving the foot marker, retrieving bags incorrectly, and hitting the wire with the hand. After three minutes the experimenter returned to supervise another round of playing for which a prize was awarded. This was done to check whether the children understood the rules, and to soothe feelings of failure among noncheaters and possible guilt among those who did cheat.

Although the inverviews obtained information about many child-rearing variables, we will confine our discussion to those that involve discipline. Burton, Maccoby, and Allinsmith (1961) reported:

> In regard to disciplinary techniques, physical punishment included such acts as spanking, slapping and shaking. Scolding was verbal reprimand, usually with a raised voice. The mother's taking away of a toy or TV was scored deprivation of object or privilege. Isolation was primarily scored for sending [the child] to his room. The prototypical response for withdrawal of love would be, "I can't love you when you do that." Visible suffering was represented by the mother's saying . . . "You must not love me to act that way." Some mothers claimed to discipline their children by discussing why they wanted them to act in certain ways and expressed the attitude that they didn't believe in punishment. The major disciplinary techniques for these mothers was "reasoning." [Pp. 699–700]

Although this description suggests that mothers used quite an assortment of disciplinary techniques, Burton and his associates noted that some mothers generally favored physical forms of discipline (spanking, slapping, shaking, scolding), whereas others favored more "psychological" techniques (reasoning, withdrawal of love, portrayal of suffering by the parent, and so on). This distinction is important because it was found that the children of mothers who preferred physical discipline were less likely to deviate from the rules of the beanbag game and therefore showed more self-control than were children of mothers who preferred other methods. This finding suggests, then, that physical modes of training may be more effective than "psychological" discipline when a child is young and unable to comprehend parental reasoning or subtle changes in parental mien. (Recall that these children were only four years old at the time of testing.) With the intellectual sophistication that evolves as the child develops, however, psychological techniques become more effective. In fact, several studies, correlational and experimental, indicate that reasoning and explanation play a very important role in the development of self-control among older children (Aronfreed, 1968; Hoffman, 1975; Leizer and Rogers, 1974). Let us see how these psychological processes operate.

COMBINING REASONING AND PUNISHMENT

Parents often provide rules of conduct for their children which are specific to the situation at hand—e.g., "Don't play with your father's sunglasses because if you were to drop them they might break." Such directives, it is thought, help children evaluate their own behavior by explaining exactly *what* activity should be avoided and *why*. To see whether this is in fact the case, Cheyne (1969) conducted an experiment with kindergarten and third-grade boys and girls to explore the effects of a combination of verbal punishment with explicit verbal directives. The children were assigned to one of three conditions:

1. Under the *punishment only* condition, children were told "That's bad" when they selected a certain toy to play with;
2. Under the *punishment plus simple rule* condition, children were told "That's bad. You should not play with that toy" when they selected a certain toy;
3. And under the *punishment plus elaborated rule* condition, children were told "That's bad. You should not play with that toy. That toy belongs to someone else."

Subsequently, when the children were left alone with the forbidden toy, those who had received the most information (those in the *punishment plus elaborated rule* condition) resisted touching and playing with it most often and for the longest periods of time. The amount of time that passed before children touched the toy is shown in Figure 12–2, which also indicates that the elaborated rule was more effective for the older children. This figure additionally suggests that the older children deviated more quickly than the younger ones when behavioral rules were presented without justification, a finding that may indicate that those old enough to benefit from a complete explanation resent not receiving one.

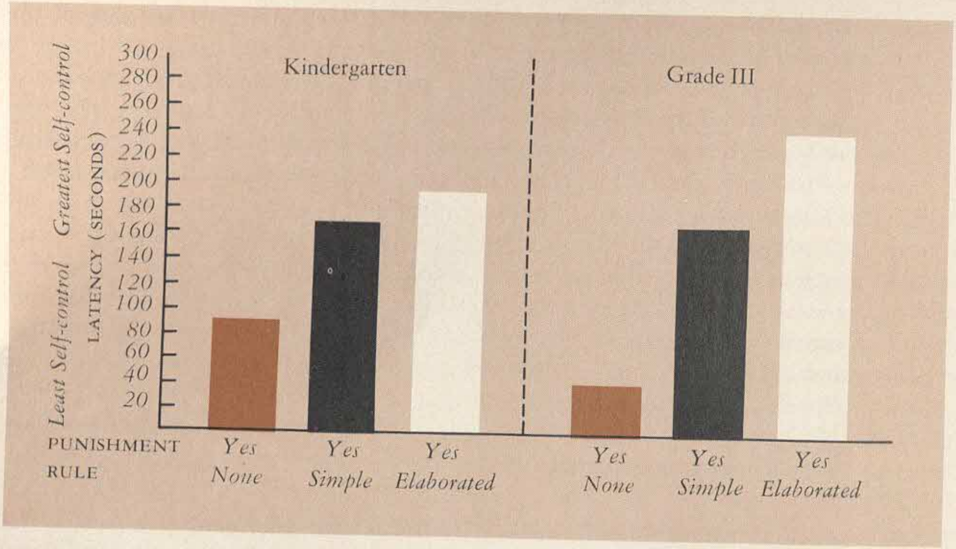


FIGURE 12-2
Amount of time (latency) before first deviation for kindergarten and third-grade boys and girls under various levels of rule structure in Cheyne's experiment. Adapted from J. A. Cheyne and R. H. Walters, Punishment and prohibition: Some origins of self-control. In *New Directions in Psychology 4.* New York: Holt, Rinehart & Winston, 1970, by permission.

Overcoming the problem of delayed punishment Long ago J. B. Watson (1924) observed: "The idea that a child's future bad behavior will be prevented by giving him a licking in the evening for something he did in the morning is ridiculous" (p. 183). As we noted in Chapter 6, delay of punishment may lead the child to associate the punishment with intervening activities and not with the undesired act. To be sure, most parents probably would not administer punishment several hours after the occurrence of an offense without providing some explanation, on the assumption that by accompanying delayed punishment with a verbal explanation they provide a symbolic reinstatement of the prohibited activity and the transgression. But does this kind of reinstatement work?

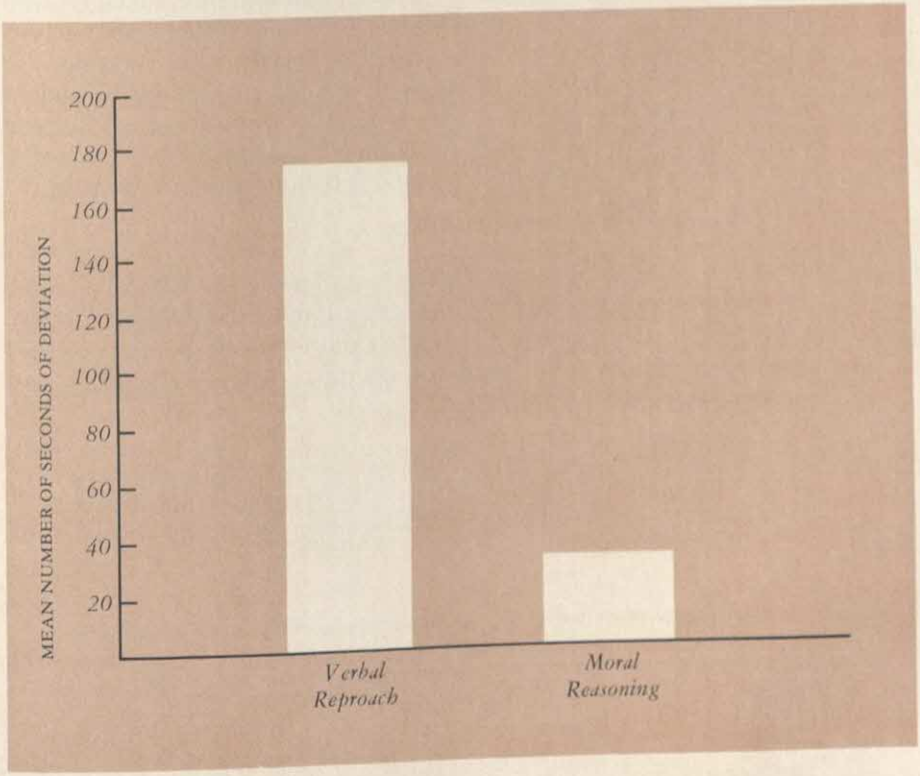
Andres (1967) conducted an experiment in which a long delay—four hours—occurred between performance of the prohibited activity (breaking a toy) and punishment (a loud and quite unpleasant sound). Each child was given a toy that was designed to break after a few minutes of play, and four hours after the experimental situation the child was brought back to receive punishment, ostensibly for breaking it. One group of youngsters were punished without a reinstatement of the situation. Another group saw a video recording of themselves breaking the toy before punishment occurred. A third group listened to the experimenter describe the transgression before punishment was administered, and still another were required to break a toy just before punishment. Subsequently, each child was left alone with a toy similar to the original broken one. Those who experienced no reinstatement played with the new toy much more often than did those who experienced any of the forms of reinstatement; moreover, reinstatement through film and verbal description were somewhat more effective than making the child repeat the transgression.

COMPARING REASONING AND PUNISHMENT

In Cheyne's study, cited earlier, various levels of reasoning or explanation were added to the basic punishment experience, and, as expected, these additions increased the punishment's effectiveness. Likewise, Andres found that the punishment gap could be bridged through reinstatement. We may still wonder, though, whether resistance to deviation can be taught to older children through reasoning alone, without having to resort to punishment, even verbal reproach, at all. One study at least has suggested that this procedure may be effective.

Leizer and Rogers (1974) taught a group of sixty first- and second-grade boys that they were not permitted to play with particular toys, either through verbal punishment ("No! That's wrong. You must not pick that toy") or through moral reasoning (e.g., by explaining that some of the toys were only for older boys). After this training, the experimenter left each child in a room with many toys, and through a one-way mirror observed how quickly the forbidden toy was touched (latency), how often it was touched (frequency), the length of time it was touched (duration), and whether the forbidden or the nonforbidden toy was touched first. On all four measures, resistance to deviation was stronger in the reasoning conditions compared with the verbal reproach condition. Figure 12–3 shows the results for duration of touching the for-

FIGURE 12–3
Mean number of seconds in which first- and second-grade boys in Leizer and Rogers's experiment played with a forbidden toy when alone, as a result of training through either verbal reproach or moral reasoning. Moral reasoning was clearly the superior approach. Data courtesy Dr. Ronald W. Rogers



bidden toy; children in the reasoning conditions spent significantly less time touching the forbidden toy than did those in the verbal reproach condition.* The overall effect was still evident fifteen days later.

DELAY OF GRATIFICATION

In *Walden Two* (1948), B. F. Skinner's novel describing a utopia built on psychological principles, preschool children are given lollipops every morning. The lollipops are not simply a treat, however, since they play an important role in teaching self-control. Specifically, the lollipops are all dipped in powdered sugar so that a single touch of the tongue can be detected. The children are allowed to eat the lollipop in the afternoon only if they can refrain from licking it at all in the meantime. In this situation, then, the child who indulges in a small immediate pleasure will have to forfeit a larger but delayed reward, the whole lollipop.

The child's problem is to learn *delay of gratification*, that form of self-control involved whenever children or adults postpone immediate gratification for the sake of more valued outcomes that will only come with patience and effort. Those college students who forego a weekend movie today in order to study so that next week they can enjoy a movie *and* an "A" are displaying delay of gratification, as are the teenagers who wait for a sale so that they can buy more (or better) clothes with the fixed amount of money they have available. Our interest in this section is to consider how delay of gratification is learned in childhood, and to examine the psychological processes that underlie this learning. Because of its central role in so many aspects of socialization, our discussion begins with a look at the role of modeled examples in acquiring the willingness to delay.

SOCIAL EXAMPLE AND DELAY OF GRATIFICATION

There is a county in Nova Scotia where conflicting subcultural patterns have endured side by side for generations (Bandura and Walters, 1963). In the Acadian community of Lavellée, children are expected to control immediate impulses and to work toward distant goals. Educational and vocational achievement is stressed.

> In terms of time orientation, the main things in life are long-range goals—such as the salvation of the soul, the economic bettering of the area, the preservation and expansion of the Acadian group—even though some of

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*Leizer and Rogers actually used two moral reasoning conditions, one of which also had a "cognitive" component designed to call particular attention to the forbidden toy. This additional element was apparently not required, and it contributed little to the overall results.

> these are unlikely to be achieved by any individual in his lifetime. . . . Work is a moral activity, and a man is enjoined not only to do it but also to take pride and pleasure in it under almost any circumstance. . . . Life without work would be life without meaning, and people who try only to get as much money as possible while doing as little as they can are disparaged. [Hughes, Tremblay, Rapoport, and Leighton, 1960, pp. 159–60]

In this community, parents spend large amounts of time with their children, in the course of which they undoubtedly transmit the adult patterns of their subculture with great efficiency. The children of Lavallée are unlikely to be swayed by the temptation to take an immediate small pleasure when it means forfeiting something worthwhile in the future.

In the same Nova Scotian county lives another group of people whose community is strikingly lacking in cohesion; fighting, drunkenness, theft, and other antisocial acts containing a component of impulse occur frequently. Adults in this subculture believe that "the best thing to do in life is to escape from one's problems as quickly as possible." Children growing up in this subculture are exposed to models exhibiting an overwhelming preference for immediate gratification.

But what would happen, hypothetically, if a child from this settlement subculture were adopted by parents in Lavellée and a child from Lavellée were adopted by settlement parents? Would the behavior of either of these children, who come to their new surroundings with habits, beliefs, and attitudes learned in their original communities, be influenced by the new models with whom they would have contact?

Bandura and Mischel (1965) provided a laboratory experiment that sheds light on this question, and in doing so they demonstrated the importance of modeling in the transmission of delay behavior. In the first part of the study, fourth- and fifth-grade children were given a delay-of-gratification test in which they were to make a series of fourteen choices between a small immediate reward and a larger delayed outcome. For instance, they were asked to choose between a small candy bar which would be given to them immediately or a larger one which would require a week of waiting. Children who displayed either predominant preferences for immediate reward or predominant preferences for delayed reward were thus identified and were subsequently assigned to one of three conditions. In the *live modeling condition* children observed an actual adult model make a series of choices between a less valuable item which could be obtained immediately and a more valuable item which required delay.* The model consistently chose the immediate reward item in the presence of children who demonstrated a preference for the larger delayed reward, whereas the model observed by a child who preferred smaller immediate rewards always selected the delayed reward item. In both cases, the model also briefly summarized a philosophy about the delay-of-reward behavior he was displaying. For example, when the choice was between a plastic chess set to be given immediately and a more expensive wooden set to be given in two weeks, the model commented, "Chess figures are chess figures. I can get much use out of the plastic ones right away" (p. 701).

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*The prizes between which the adult model chose were suitable for adults (chess sets, magazines, and so forth) and were different from the items between which the children subsequently chose. Thus, each child was able to imitate the "principle" underlying the model's behavior but was unable to copy his specific choices.

In the *symbolic modeling condition*, children were exposed to the same kind of sequence except that the model's choices and comments were presented in written form. Finally, in the *no model present condition*, children serving as controls for the possible effects of mere exposure to rewards were simply shown the series of paired objects. All children were then given a delay-of-reward test in the model's absence; to assess the stability of any changes in behavior, they also were given a subsequent delay-of-reward test one month later.

The results of the Bandura and Mischel experiment were clear. Children exposed to a model (live or symbolic) who delayed gratification shifted their own preferences so that on posttest about 50 percent of all their choices were for the larger outcomes that required a period of waiting. Even after a month's time these effects were still present. On the other hand, children exposed to models who exhibited little self-control were easily swayed by the impulsive model whom they saw and abandoned their self-control in favor of small immediate gratifications in the majority of cases. We might well expect, then, that our hypothetical child from the settlement culture in Nova Scotia would be influenced by observing the self-restraint in the behavior of the citizens of Lavellée and that, conversely, the behavior of our hypothetical child from Lavellée undoubtedly would be influenced toward less self-restraint through observation of role models in the settlement culture.

PSYCHOLOGICAL PROCESSES IN DELAY OF GRATIFICATION

Although Skinner's utopia would certainly offer children numerous adult models of self-control, more direct efforts to teach delay of gratification are also prescribed. Here is the way Frazier, the storyteller of *Walden Two*, puts it:

> First of all, the children are urged to examine their own behavior while looking at the lollipops. This helps them to recognize the need for self-control. Then the lollipops are concealed and the children are asked to notice any gain in happiness or any reduction in tension. Then a strong distraction is arranged—say, an interesting game. Later the children are reminded of the candy and encouraged to examine their reaction. The value of the distraction is generally obvious. . . . When the experiment is repeated a day or so later, the children all run with the lollipops to their lockers . . . a sufficient indication of the success of our training. [P. 108]

Such training supposes that delaying gratification involves two steps: an initial decision that one wishes to wait and then an effort to maintain one's resolve and bridge the waiting time. Walter Mischel, who has done most of the pioneering experimental work on delay of gratification, has also conceptualized the underlying psychological process as involving these two steps and, what is more, has shown that the steps are influenced by somewhat different factors (Mischel, 1974). Following this lead, our discussion here begins with a closer look at the decision process.

TO WAIT OR NOT TO WAIT

In situations where the child must make a choice between accepting or not accepting the frustration of delay for the sake of earning a superior outcome, he or she probably considers the subjective values of both the immediate and delayed rewards and the probability of obtaining them (Mischel, 1958; Mischel and Metzner, 1962).

In the excerpt from *Walden Two*, for example, the delayed reward (a whole lollipop) probably would be considered superior to the immediate reward (a few licks of a lollipop) by most youngsters. But the course of action also depends on the trustworthiness of the people giving the lollipops, which introduces an element of risk in waiting. And there is another consideration. In most life situations, attaining delayed rewards involves not only simply waiting but also engaging successfully in some required activity. Thus, the child's confidence in being able to perform this activity is undoubtedly related to the decision.

When the difference in value between the immediate and the delayed reward is slight and/or the risk of not being able to obtain the delayed reward despite the delay is great, the rational choice (and the one children presumably make) is to take the immediate reward. On the other hand, when the difference in subjective value is substantial and/or when obtaining the delayed reward is not too risky, the rational choice may be the delayed reward (Mischel and Staub, 1965).

Once the choice has been made to wait for the delayed but superior prize, a question arises as to whether the child will be able to go through with the plan. Although older children tend to exhibit more self-control in this respect than do younger ones (Mischel and Metzner, 1962), delaying reward can be difficult at any age. Experimental work in the area, however, is beginning to provide knowledge of the ways in which a frustrating time span is tolerated.

MAINTAINING DELAY OF GRATIFICATION

Freud (1959) suggested that delay of gratification could be bridged by creating mental images of the desired object, thereby producing substitute satisfactions that ease the frustration of delay. Others have advanced similar notions—namely, that any process that makes the delayed object-situation salient should facilitate waiting for it.

Using Freud's theorizing as an initial framework, Mischel and his associates have conducted an extensive program of research aimed at better understanding of delay of gratification. Mischel and Ebbesen (1970), for example, predicted that children would find waiting for a delayed reward easiest when they could see the large reward, whereas waiting would be most difficult when no reward was in sight. It was reasoned that viewing rewards would serve as a vivid reminder that reward was worth waiting for, and would also increase the child's trust in actually receiving the reward. This prediction obviously contradicts the principle of distraction described in the previous excerpt from *Walden Two.*

To test their prediction, Mischel and Ebbesen set up the following situation. Three- to five-year-old children first were asked which of two foods (cookies or pretzels) they preferred, and each youngster then was told that he or she would wait alone in a room until the experimenter returned, whereupon the preferred food would be provided. The child could also call the experimenter back to the room at any time by a prearranged signal; in this case, however, only the nonpreferred food would be provided. The experimenter then departed, leaving on the table both foods, the preferred food only, the nonpreferred food only, or neither food (see Figure 12–4). He returned in fifteen minutes, or earlier if summoned by the child. The length of time children in the different food conditions waited was the dependent measure of the study. Figure 12–5 shows that the results were opposite from the investigators' expectations; that is, children who were exposed to neither of the foods delayed significantly more than those exposed to both or one of the foods. It is quite striking that the children in this group were able to sit alone for an average of over eleven minutes—and that 75 percent of them had to be interrupted at the fifteen-minute mark.

Observations of all the children's behavior through a one-way mirror provided a clue as to how time was bridged. Elaborate distraction techniques were designed spontaneously: some children sang, talked to themselves, and invented games. Among those children who successfully waited when food was present, many avoided looking at it by covering their eyes with their hands or resting their heads on their arms. It appeared that any activity that converted the situation into a less frustrating experience could increase delay time, and so Mischel and his associates began to experiment directly with various techniques that might either distract children or help them transform the situation into one in which waiting would become easier.

The focus of these later investigations has been quite cognitive in emphasis, in the sense that what the child *thinks* has been of central interest. One study showed that when children are asked to think about "fun things" their ability to bridge a wait period increases, whereas thinking "sad thoughts" reduces waiting and causes most children to take the immediate reward and terminate the delay (Mischel, Ebbesen, and Raskoff, 1971). But what happens if the child thinks about the

FIGURE 12-4 (Right)
A preschool child waiting for delayed gratification. Courtesy Dr. Walter Mischel.

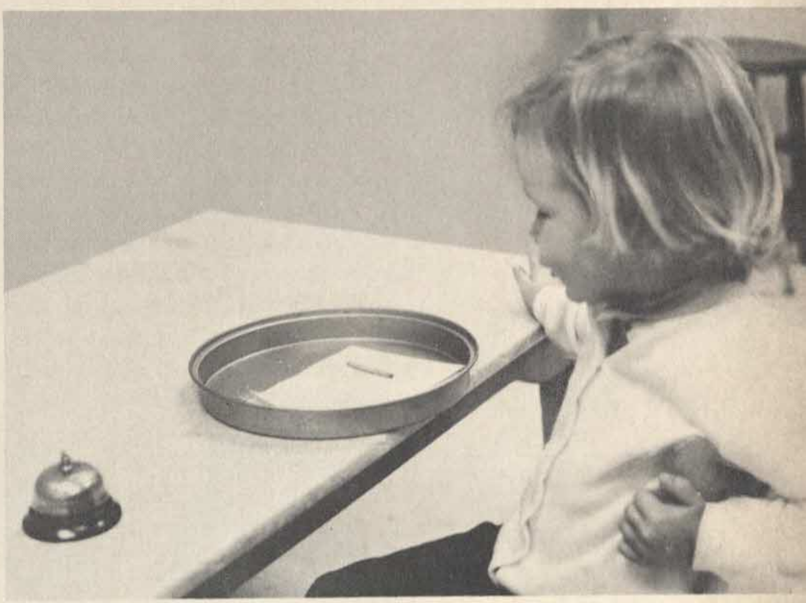
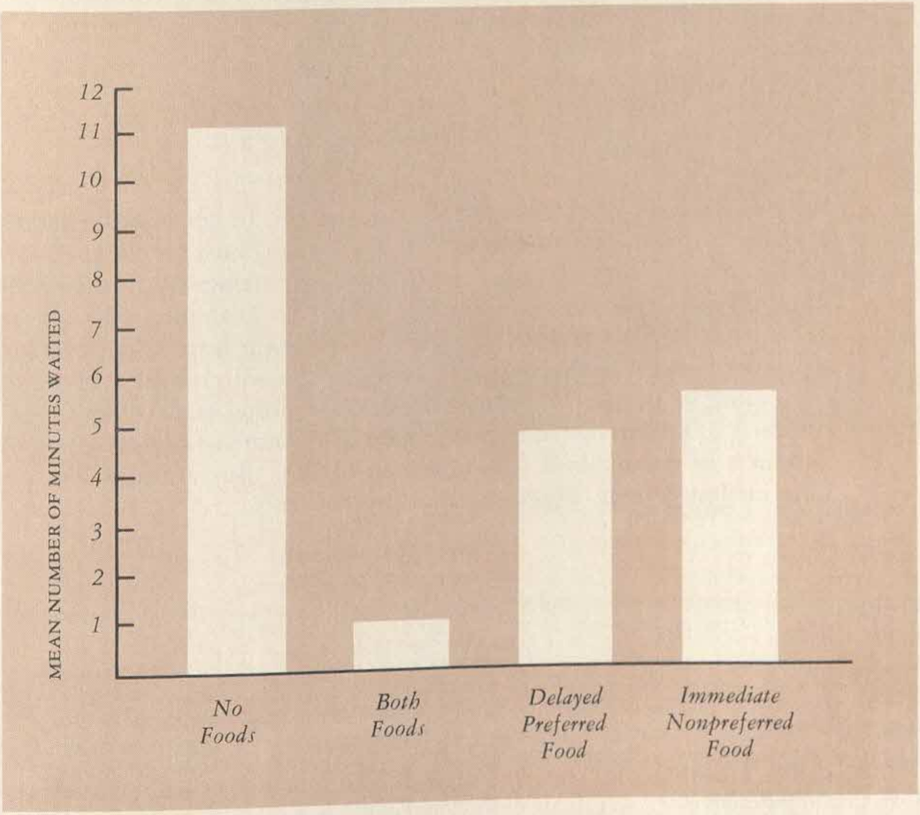


FIGURE 12-5 (Below)
Average amount of time children were able to wait for the delayed but preferred food in Mischel and Ebbesen's (1970) experiment. Note that children were able to wait longest when *no* foods were present in the room, and least able to control themselves when both foods were present. Which of the foods (delayed or immediate) was present did not seem to matter. Adapted from Mischel and Ebbesen (1970).



rewards themselves? Is that a type of fun thought that increases self-control, or is it a representation of the desired outcome that arouses appetites and decreases the ability to wait just as the presence of the "real thing" did in Mischel and Ebbesen's (1970) original study? The answer to these questions suggests that some subtle and complex mental processes are involved in self-control.

An impressive series of investigations, reviewed by Mischel (1974), shows that it is *how* the child thinks about the desired object or outcome that makes all the difference. In one study, children facing real rewards for which they had to wait were able to delay gratification more than twice as long (18 minutes vs. 8 minutes) if they made believe to themselves that the real object in front of them was only a picture.* And thinking about an absent reward in a way that is concrete and arousing (for example, thinking about *eating* the pretzels or marshmallows for which you're waiting) robs the child of self-control almost as thoroughly as looking at the real thing. "It seems likely," Mischel concludes, "that abstract cognitive representations of the rewards [for example, thinking of them only as pictures] permit the subject to remind himself of the contingency, and to engage in self-reinforcement for further delay" (1974, p. 286). His remark raises the question of how children do set standards for themselves and administer self-rewarding consequences. We now turn to these very issues.

ACHIEVEMENT STANDARDS AND STRIVINGS

All people come to set standards for themselves. In general, the higher or more stringent the standard, the more effort must be expended to attain it. People differ, though, in regard to the stringency of their self-imposed standards. Some schoolchildren, for example, will appear pleased and delighted to receive a "B," indicating better than average mastery of academic subject matter, while others will chastise themselves for failing to get an "A," the mark of outstanding achievement. Self-imposed standards of achievement and self-reward are of course largely products of socialization. The question of how they are acquired has long intrigued many developmental psychologists.

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*This requires a bit of training, of course. Here is an extract from the actual instructions used, illustrating the point:

> . . . Close your eyes. In your head try to see the picture of the ——— (immediate and delayed rewards). Make a color picture of (them); put a frame around them. You can see the picture of them. Now open your eyes and do the same thing. (more practice) . . . From now on you can see a picture that shows ——— (immediate and delayed rewards) here in front of you. The ——— aren't real; they're just a picture. . . . When I'm gone remember to see the picture in front of you. [Mischel, 1974, p. 285]

SELF-IMPOSED STANDARDS OF SELF-REWARD

One experimental situation used to study children's self-imposed standards involves three basic characteristics: (1) the child performs a task which he or she believes to be one of achievement or skill; (2) the child is able to self-administer rewards so that his or her self-imposed criterion determines the amount and frequency of the rewards; and (3) no external socializing agent is present.

A report by Liebert and Ora (1968) illustrates the manner in which children's self-imposed standards have been studied in this way, using the miniature bowling game pictured in Figure 12–6.

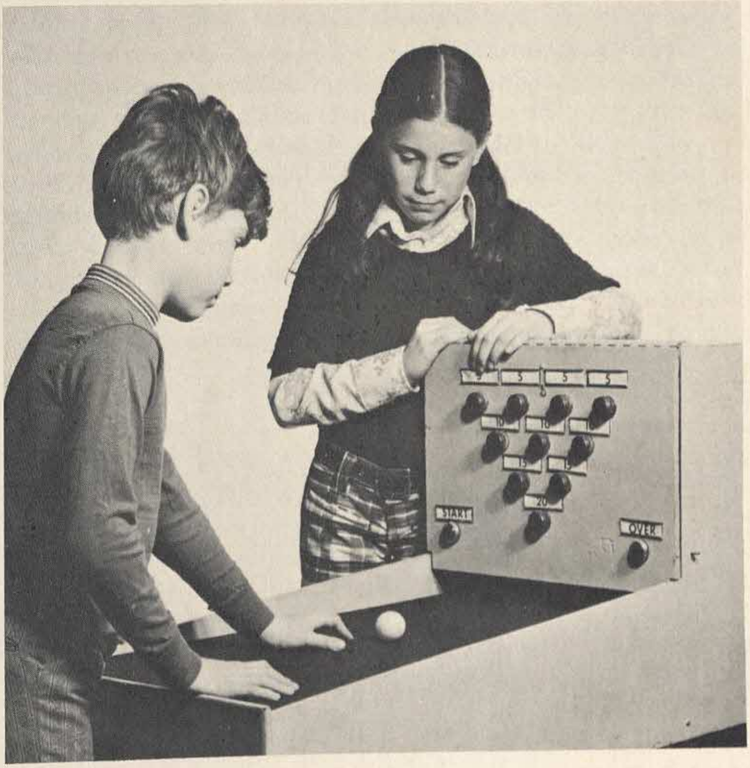


FIGURE 12–6
The bowling game used in Liebert and Ora's experiment. Photo by Al Stopler.

At the end of the three-foot runway is a panel of lights; ostensibly they indicate the score earned by rolling the ball down the alley to upset a set of pins. One of the lights—marked "5," "10," "15," or "20"—comes on after each turn. Although the apparatus is preprogrammed to produce a fixed pattern of scores, children actually think the game is one of skill.

Because Liebert and Ora were interested in investigating factors of training and incentive, children in their study were assigned to either the *high incentive condition*, in which each was informed that he or she might win one of a display of prizes ranging in price from ten cents to twelve dollars but that a large number of reward tokens would be required for the most valuable prizes, or the *low incentive condition*, in which the chance to win prizes was not mentioned. Children in the two experimental groups were then given training. Those in the *modeling* condition observed an adult male bowl ten trials, rewarding himself with plastic tokens for all scores of 20 but never for lower scores. For each score of 20 he announced, "20, that's a good score. That deserves a chip"; for each score below 20 he announced,—"that's not a very good score. That doesn't deserve a chip." In the *direct training condition*, the child bowled ten trials in the training agent's presence and heard the same rules indicating that scores of 20 but not others merited self-reward—e.g., "15, that's not a very good score. I don't think you deserve a chip for that score." Those in the *control* group received no training. Finally, each child was left alone to play the game while his or her behavior was surreptitiously observed.

Children in both training groups—*modeling* and *direct*—adhered to the high achievement standard to a much greater extent than did those in the control group, but the presence of an attractive incentive tended to reduce the stringency of self-imposed standards in all cases (see Table 12–1). Thus it appears that self-imposed standards and patterns of self-reward are set in response to the specific demands of a particular situation and, potentially, are modifiable by new training and experiences.

TABLE 12–1
MEAN NUMBER OF DEVIATIONS FROM THE STANDARD PROVIDED BY THE TRAINING AGENT IN LIEBERT AND ORA'S EXPERIMENT

SUBGROUP	CONTROL	MODELING	DIRECT TRAINING
Low incentive	7.42	0.92	0.08
High incentive	12.75	3.25	2.92

Source: Liebert and Ora, 1968.

As a further example, consider another study employing the same bowling game procedure (Liebert and Allen, 1967), which investigated the effects of combining modeling cues with the model's presentation of a rationale for his action. All children observed a model playing a bowling game in which he rewarded himself for very high scores (20) and refused to reward himself for any of the lower ones (15, 10, and 5). Half the children heard the model verbalize a reason for his actions, "20 that's a good score . . . that deserves a chip" or "15, that's not a very good score . . . that doesn't deserve a chip." For the other half of the subjects the model rewarded himself according to the same standards but did not offer any verbal rationale. Subsequently, all subjects were left alone to play the game. The children who heard the rule of conduct in addition to observing the model's behavior imitated the model's restraint much more when alone than did those who merely observed the model perform. Other studies subsequently have confirmed the finding that verbalizations in the form of rules of conduct appear to be an effective adjunct to learning standards through observation (Liebert, Hanratty, and Hill, 1969).

In life situations, children are exposed to many models, including mother, father, teachers, and playmates, and thus they may observe discrepant standards of achievement. What role might such discrepancies play in determining the child's self-imposed standards? In one study (McMains and Liebert, 1968), fourth-grade boys and girls played the bowling game mentioned previously with an adult. During the training period, the adult always imposed a stringent criterion on the child. Half of the subjects were in a *consistent training* condition in which the training agent modeled the same stringent self-reward criterion that he imposed on the child; the remaining subjects, however, were in a *discrepant training* condition in which the training agent's self-reward criterion was more lenient than the criterion he imposed on the children. Subsequently, each child was left alone to play the game; and adherence to the stringent standard initially taught to all children was measured (Test 1). During the next phase of the experiment, the children looked on as a second adult played the game. The second agent either exhibited the same stringent standard that the children had been taught originally or modeled the more lenient one. A second measure of each child's own self-imposed standard was then taken (Test 2).

The mean self-leniency scores (i.e., the average number of times children rewarded themselves for scores below the stringent standard) on Test 1 appear in the top half of Figure 12–7; when children were taught a standard of achievement that the adult upheld himself, they imposed that standard upon themselves much more readily than when taught a standard that was not practiced by the adult who preached it.

The data from Test 2 appear in the bottom half of Figure 12–7. Even though all children were taught to use the stringent standard, those who saw two adults adopt a more lenient one almost invariably ignored the rule themselves when alone. In marked contrast, children who saw two adult models behave according to the original stringent standard adopted it themselves quite readily; in fact, *all* of the girls—and most of the boys—did so. In sum, this study indicates that the achievement standards set by children for themselves are strongly influenced by the kind of behavior they observe around them. Even clearly stated parental aspirations may be ignored if they are not consistently reinforced by appropriate adult example.

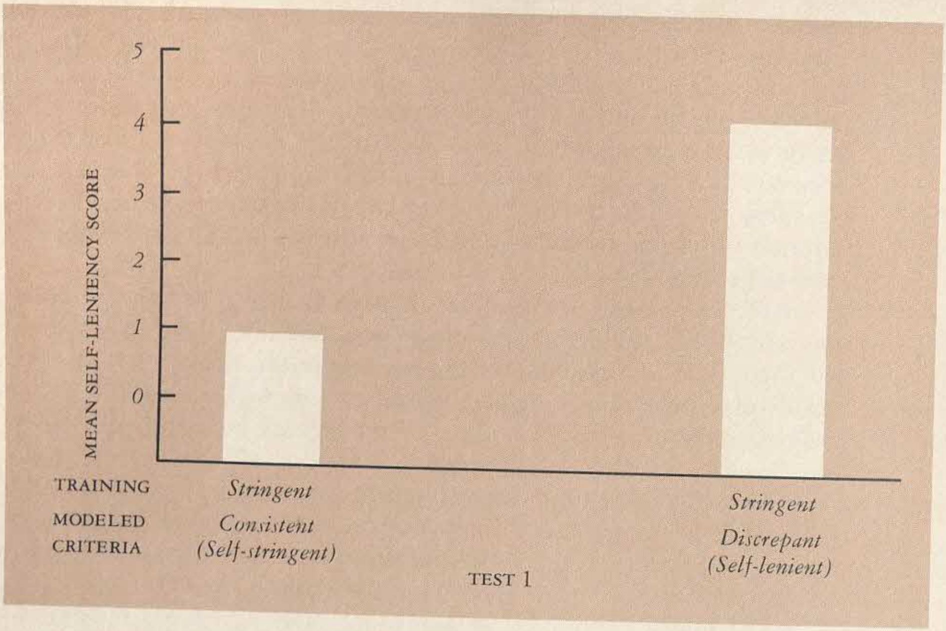
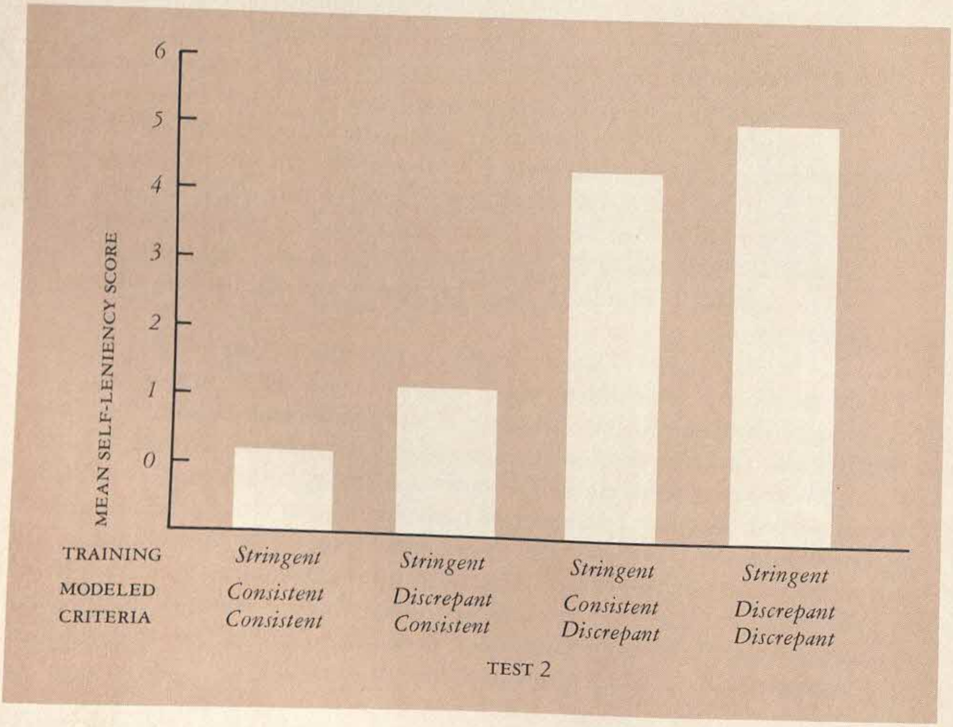
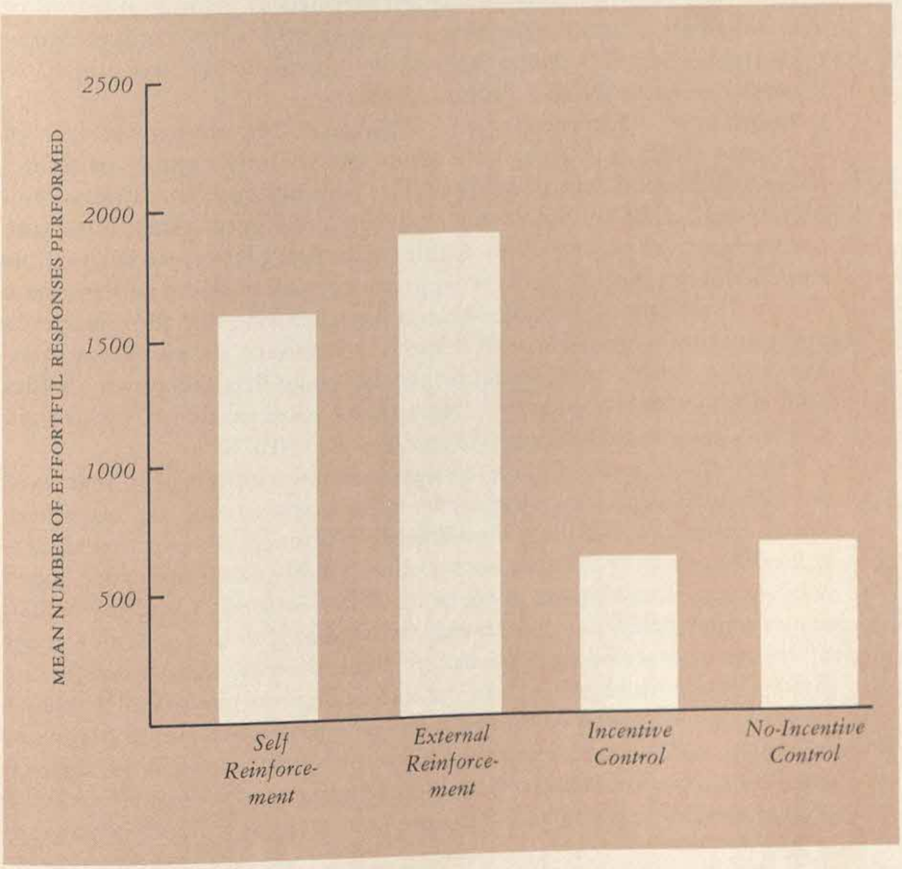


FIGURE 12–7
Amount of self-leniency shown in McMains and Liebert's (1968) experiment as a result of exposure to consistent and discrepant models. Note that all children were directly trained to behave self-stringently.



Is self-reward reinforcing? In the studies described above, children administered rewards to themselves, contingent on their own performance. Recently investigators have begun to ask whether such self-administered consequences can maintain behavior just as externally imposed rewards do. The answer appears to be yes. Bandura and Perloff (1967), for example, asked seven- to ten-year-old boys and girls to set their own standards on a specially devised crank-turning task and to reward themselves whenever their self-imposed standards had been met. Children in another group had the same standards imposed upon them and were rewarded by an adult for meeting them; that is, these latter children experienced the usual externally imposed reinforcement procedure. Finally there were control groups who received either no reward or a lump sum "inheritance" at the outset. Results, measured in terms of actual effortful behavior, were striking: those who set their own standards and rewarded themselves were as productive as those rewarded by an adult; both groups substantially outperformed the controls (see Figure 12–8 below.)

FIGURE 12–8
Number of effortful responses in all groups of Bandura and Perloff's experiment.



Subsequent studies also have shown that highly valuable self-administered rewards are more effective in maintaining one's own productivity than less valuable ones (Liebert, Spiegler, and Hall, 1970) and that self-determined reward standards are as effective in maintaining a more academic task—solving arithmetic problems—as are externally imposed criteria (Felixbrod and O'Leary, 1973). All of these findings suggest that the self-administration of consequences might be taught to children for the very practical purpose of influencing their own study habits. In fact, one study (Harris and Trujillo, 1975) has shown that training in appropriate self-reward can lead to improved school grades among junior high school students.

THE ACHIEVING CHILD

The setting of personal standards, discussed above, is integrally related to achievement striving. Achievement-oriented behavior may occur in the arts, academics, sports, or any endeavor where level of performance competence is involved. Competence, however, can be shown only in situations in which there is a "standard of excellence" which may be applied to the performance and which is agreed upon by those concerned. For purposes of the following discussion, then, *achievement behavior* will be defined as any action directed at gaining approval or avoiding disapproval from oneself or from others, for competence in performance where public standards of excellence are applicable (Crandall, Katkovsky, and Preston, 1960a).

Substantial differences in achievement striving among children of five years of age and older have been observed in a number of studies (Crandall, Preston, and Rabson, 1960; Tyler, Rafferty, and Tyler, 1962; McClelland, 1958). While some children show great persistence with tasks requiring skill and effort at this age, others do not; similarly, while some children tend to seek recognition for achievement, others seem to care little for such reward. And it is not surprising that the emergence of achievement motivation is related to cognitive development, inasmuch as children must recognize intellectually that their own abilities and effort produce success or failure as a precondition for certain kinds of attainment striving (Weiner and Kun, 1976).

How, though, should we conceptualize the differences that exist among children in their striving for success, even from the first school years? Some theorists have viewed these differences as reflecting underlying differences in children's achievement motivation (also called "need achievement"), a concept used in an effort to predict and/or explain achievement behavior. In assessing the relative amount of achievement motivation possessed by a particular child, the examiner listens as the child tells a story about each of several ambiguous pictures. The child's replies are scored according to the frequency of achievement themes in his or her stories; the method, developed by David McClelland, is based on the assumption that, to the degree that achievement motivation is part of the child's personality, achievement imagery will find its way into the youngster's storytelling (McClelland, Atkinson, Clark, and Lowell, 1953).

In a work entitled *The Achieving Society*, McClelland (1961) took an unusual research tack. He attempted to "predict" the economic growth of twenty-three countries between 1929 and 1950 on the basis of the amount of achievement imagery appearing in their children's stories for the period 1920–1929. The achievement motive found in the children's stories correlated +.53 with an index of national economic growth. McClelland concludes from this and other similar studies that children's stories reflect ". . . the motivational level of the adults at the time they are published, perhaps particularly of the adults responsible for the education of children. . . ." (p. 102). These correlational findings dovetail with those of a recent experimental study in which preschool children's efforts to complete an achievement-related task increased after being read a story relating the achievement-oriented behavior of a child of their own sex (McArthur and Eisen, 1975).

But high achievement motivation as measured by children's storytelling is not always related to real-life achievement strivings (Crandall, 1967), and, more importantly, the focus of achievement efforts varies markedly from one child to another. It is not unusual for a child to spend a great deal of time and effort developing competence in one area, say physical skills, while expending a great deal less time and energy with other kinds of activities, such as artistic or intellectual pursuits (Crandall, 1961).

PARENTAL CHILD-REARING PRACTICES AND ACHIEVEMENT STRIVING

Among the questions asked by parents and educators, almost none is more frequently heard than, "What factors in child rearing encourage and discourage achievement striving in youngsters?" A complex answer is suggested by a number of different correlational studies. Many parental attitudes and child-rearing practices, including independence training (Winterbottom, 1953; Feld, 1959), reward of achievement efforts (Crandall, Preston, and Rabson, 1960), and encouragement and instigation of intellectual pursuits (Crandall, Katkovsky, and Preston, 1960b), are associated with achievement striving.

Winterbottom (1953), in what is now considered a classic study, gave eight- to ten-year-old boys the rudiments of a story (e.g., "Brothers and sisters are playing. One is a little ahead.") and asked them to elaborate on it. The frequency of achievement themes in the boys' stories was then related to the child-rearing practices to which they had been exposed, as reported by their mothers. Winterbottom's principal finding was that mothers of high achievement-oriented boys differed from other mothers in (1) fostering early independence of thought and action—e.g., encouraging the child to try things for himself, and (2) generously rewarding successful performance with affection and attention.

In a later study (Rosen and D'Andrade, 1959), a team of investigators went into private homes to observe youngsters who were either high or low in achievement motivation. Each boy was given a demanding and potentially frustrating task: to build a tower out of irregularly shaped blocks with one hand—while blindfolded. The boys' parents were asked to watch and were permitted to give any sort of rewards they wished so long as they did not touch the blocks or provide direct assistance. Confirming Winterbottom's report, mothers of high-achieving boys were warmer and more encouraging than other mothers. The fathers of low-achieving boys also differed from others in a noticeable way: they tried to make their sons' decisions for them and became quite irritated whenever the boys had any difficulty.

THE ROLE OF EXPECTANCIES

In contrast to achievement needs, expectations of success are treated as specific to a particular kind of endeavor—for example, sports, mathematics, or art. But the actual role of expectancies in achievement-related behavior is a question for research. Virginia Crandall and her colleagues at Fels Research Institute have made unique contributions in this area.

One important disclosure from Crandall's work is that the degree to which a child *expects* to succeed has a major bearing on whether he or she actually does or not. In an Ohio junior high school, for example, it was found that students who expected to obtain good grades in mathematics and English actually got the better grades in these courses. In part, we might explain these findings by saying that the more able youngsters simply (and realistically) have higher expectancies. However, when IQ and expectancy diverged (for example, when a student with a low IQ had high expectancies or vice versa), expectation of success rather than IQ was associated with the obtained grade. In other words, to at least some degree, children who expect to succeed actually do better (Crandall, 1967). They will spend more time and effort in studying than the child who expects to fail, for whom such an investment often seems futile.

In light of the importance of expectations, it will be disquieting to many that girls' expectancy estimates are consistently lower than boys'. In a laboratory study performed at Fels Research Institute, for example, elementary school boys and girls were given six kinds of school-like tasks, and each child was asked to estimate how far he or she could go before the task became too difficult. Girls tended to expect to be beaten by the task at much lower levels of difficulty than boys, despite the fact that they actually had *higher* IQs on the average (mean IQ for females 114, mean IQ for males 107).

Although girls often tend to estimate their own intellectual and academic capabilities lower than what an objective observer might expect on the basis of past performance, boys tend to behave in exactly the opposite fashion, estimating their level of competence higher than what past performance would indicate. Why should this be the case? The question has not yet been answered. It is possible that girls get less positive reward for achievement than boys, although this is probably not the sole reason for the difference. Crandall and her associates suggest that life experiences can be contradictory in the sense that situations often simultaneously provide reasons to feel competent and reasons to feel incompetent. Thus boys, they suggest, may focus on positive feedback, whereas girls may be unduly sensitive to reproof and thus tend to construct biased pictures of their own capabilities.

INTERNAL VERSUS EXTERNAL CONTROL

Another attitude that appears to be conducive to achievement striving is the general feeling that one has some control over the situations one encounters. Children differ in the extent to which they believe that their own actions can influence the outcome of events. Some tend to assume that they are responsible for their successes and failures; others tend to attribute responsibility to outside agents, luck, fate, and other people. The extent to which children believe that the locus of responsibility for achievement is internal rather than external can be measured by the "Intellectual Achievement Responsibility Questionnaire," a thirty-four-item scale which measures responsibility for both pleasant and unpleasant consequences. Each item consists of a description of an achievement-related experience which might have occurred in the child's life, followed by one alternative stating that the event occurred because of the child's own actions and another stating that the event was caused by other forces. Exemplary items from the IAR Scale are presented in Table 12–2 below.

In answering the questionnaire, the child is asked to pick the answer for each item "that best describes what happens to you or how you feel."

TABLE 12–2
SAMPLE ITEMS FROM THE INTELLECTUAL ACHIEVEMENT RESPONSIBILITY QUESTIONNAIRE (IAR) USED BY CRANDALL AND HER ASSOCIATES

1. If a teacher passes you to the next grade, would it probably be
______ a. because she liked you, or
______ b. because of the work you did?

2. When you do well on a test at school, is it more likely to be
______ a. because you studied for it, or
______ b. because the test was especially easy?

3. When you read a story and can't remember much of it, is it usually
______ a. because the story wasn't well written, or
______ b. because you weren't interested in the story?

4. Suppose your parents say you are doing well in school. Is this likely to happen
______ a. because your school work is good, or
______ b. because they are in a good mood?

Source: Courtesy Virginia Crandall.

It is not surprising to find that children who score high as "internalizers" on this scale tend to get better grades and do better on achievement tests than do those who score high as "externalizers" (Crandall, Katkovsky, and Crandall, 1965). Internalizers may well show greater initiative and persistence in solving difficult problems and a ready willingness to modify their behavior to achieve the desired goal, whereas externalizers may see little reason to initiate, persist, or modify their behavior inasmuch as they feel the outcome is not under their control. In some situations the IAR scale is a better predictor of achievement than are measures of achievement motivation (Crandall, Katkovsky, and Preston, 1962).

The generalized tendency to attribute control of rewards to internal or external sources was examined in eighty school children, black and white, of both middle- and lower-class backgrounds (Battle and Rotter, 1963). The children were required to answer a twenty-three-item yes-or-no questionnaire and a six-item cartoon test. The results indicated that middle-class children, in general, were much more internal in their attributions than were lower-class children. Moreover, middle-class white children were most internal, whereas lower-class black children were most external. Middle-class blacks, however, held roughly the same attitudes in regard to locus of control as did middle-class whites. These results suggest that children who reasonably might perceive that opportunities are open to them—the middle-class children, whether black or white—come more easily to believe they can influence their own destinies. On the other hand, children who see that they have no chance to obtain material rewards may tend to defend themselves with "external" attributions of causality. Consistent with this reasoning, a report published by the U.S. Office of Education (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, and York, 1966) showed that school achievement among children of minority groups is predicted better by belief in internal or external control of reinforcement than by any of a vast array of attitudinal, familial, and school-related variables.

THE DEVELOPMENT OF MORAL VALUES

There is little doubt that most children develop, during their early years, a set of values or principles regarding correct, appropriate, or good behavior. At one time the study of moral development was considered to be—at best—on the fringes of psychology, but recently it has come to the fore as a worthy topic that has important social implications.

THE PSYCHOANALYTIC VIEW

The traditional view of morality, favored in nineteenth-century Europe, presumed that values of the kind we call "moral" were provided by God. Then Freud, a revolutionary thinker in his time, argued that quite the reverse is true. The neonate, he argued, is naturally without concern for the welfare of others. Moral values, if they are present at all, must be cultivated after birth. Psychoanalytic theory offers a view of moral development rooted in the emergence of the *superego*. The superego—a part of each individual's personality—is said to develop as the child "takes in" parental values, at about the fourth or fifth year of life. The formation process itself, intimately linked to the resolution of the Oedipal conflict (see Chapter 10), is explained in terms of identification.

The implications of Freud's identification theory, as applied to moral development, are straightforward. The child's moral values either will parallel those of the parents or, if appropriate identification does not occur, the youngster will have an inadequate superego and few moral values or none at all. In either case, though, the critical period is presumed to be the first few years of life.

An extensive review of the available evidence does *not* support this one-process view of moral development (Hoffman, 1975). This does not mean that parents are not important models in the moral sphere, for they certainly are; but it is simply not plausible that a person's early identification with parents is solely responsible for all his or her own moral attitudes and actions in adulthood. Hoffman (1971), for example, points out that young children lack the cognitive skills needed to classify parental examples of moral behavior or infer their motivations and that in any event parents rarely express morally relevant feelings (e.g., guilt or self-criticism) in their children's presence.

CONSISTENCY OF MORAL VALUES AND BEHAVIOR

Parents often expect that the various aspects of a child's moral values and behavior will be quite consistent, as if some youngsters simply have higher standards or a more completely developed conscience than others. One of the most important descriptive studies of moral behavior in children, conducted many years ago (Hartshorne and May, 1928; Hartshorne, May, and Shuttleworth, 1930), was designed to address this very issue.

Hartshorne and May's research

Hartshorne and May observed thousands of children in many situations—at home, playing party games, in athletic contests—in which the child could commit transgressions such as lying, stealing, and cheating without being aware that they were detected. Contrary to their original expectations, the investigators found little consistency in the actual performance of individual children.

Suppose, for example, that two children, A and B, were placed in a situation where cheating was possible and A cheated while B did not. Could we now safely predict that in another, different situation A would be more likely to cheat than B? Hartshorne and his associates found that the answer to this question was no.

Ironically, though, the investigation revealed a good deal of consistency in the children's responses to queries conducted in their classrooms about their moral values and opinions. But verbally expressed moral values appeared to have little to do with action; often youngsters who cheated expressed as much or more disapproval of cheating as those who did not. And it appeared that even when honesty was not "forced" by concern about detection and punishment, social factors such as approval of one's peers, rather than an inner moral code, were critical.

Burton's analyses Hartshorne and May's findings continue to surprise many people, and one may rightly wonder whether their conclusions would have been different if more powerful tools of analysis or experimentation had been used. But Roger Burton, who has been a leading contemporary figure in studying the consistency or variability of children's moral behavior, has suggested that the original conclusions were basically sound. Burton (1963) employed highly sophisticated techniques to reanalyze Hartshorne and May's data and found at best a very limited hint that there is some generality to honesty. In a more recent work, Burton (in press) also concludes that "none of the fantasy responses [used to assess conscience development], regardless of their content, can be used in any simple way to predict honesty or cheating." He also reports that children who cheat seem to be the very ones who show strong signs of reparation and guilt, suggesting that these responses may have been learned only to quiet an angry parent and therefore forestall punishment. This is hardly the outcome we would expect if guilt were a measure of a child's underlying conscience. And, finally, Burton reports sex differences that are situation-specific rather than highly general. Girls are more likely to cheat than boys when the adult being cheated is female (Burton, in press; Hartshorne and May, 1928). But when a male adult is involved, boys are more likely to cheat than girls (Leff, 1969; Stephens, Miller, and McLaughlin, 1969).

THE COGNITIVE APPROACH TO MORAL DEVELOPMENT

Piaget was the first to suggest the possibility of a sequence of stages of moral growth, roughly paralleling his general theory of cognitive development (see Chapter 7). Another cognitive theorist, Lawrence Kohlberg, has begun to explore more completely the development of moral values within a cognitive stage theory framework. He has been concerned primarily with the development of the child's moral judgments rather than moral actions. The child, says Kohlberg, must be viewed as a "moral philosopher."

But what is the child's philosophy? To answer this question, Kohlberg analyzed free responses to hypothetical moral dilemmas such as the following:

> In Europe, a woman was near death from cancer. One drug might save her, a form of radium that a druggist in the same town had recently discovered. The druggist was charging $2,000, ten times what the drug cost him to make. The sick woman's husband, Heinz, went to everyone he

> knew to borrow the money, but he could only get together about half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No." The husband got desperate and broke into the man's store to steal the drug for his wife. Should the husband have done that? Why? [Kohlberg, 1969, p. 379]

A child's responses to dilemmas such as this one are usually based on one or more general aspects of the problem, such as the motives or intentions of the people involved. After eliciting responses to a large number of dilemmas from many children, Kohlberg feels he has been able to distinguish three levels of moral thinking: *preconventional*, *conventional*, and *postconventional*.

The preconventional child is often well behaved and sensitive to labels such as good and bad. But the latter are interpreted simply in terms of their physical consequences (punishment, reward, exchange of favors) or in terms of the power of those who make the rules. There is, then, no real standard of morality at the preconventional level. The conventional level is characterized by conformity to the existing social order and an implicit desire to maintain that order. Most American adults, according to Kohlberg, operate at the level of conventional morality. Finally, the postconventional level is said to be governed by moral principles that are universal, and therefore valid independent of the authority of the groups who support them.

Within each of these three levels, Kohlberg (1963, 1967) suggests, are two discernible stages, producing the full complement of six stages shown in Table 12–3.

Concrete examples of the type of moral judgments made in response to the dilemma described in the story of Heinz and his dying wife are shown in Table 12–4. The stages are *not* differentiated by what decision is made, but by the reasoning that underlies the decision.

Kohlberg reports that moral development may be either fast or slow, but that it does not skip stages. Children in Taiwan, Malaya, Mexico, and Turkey all show the same sequence. Further, this orderly pattern is not related to religious beliefs; no differences are said to exist in the development of moral thinking among Catholics, Protestants, Jews, Buddhists, Moslems, or atheists. Thus moral thought appears to follow a universal pattern typical of all other kinds of thought; progress is characterized by increasing differentiation and integration.

The significance of Kohlberg's analysis for psychologists has been considerable, for his work suggests that a better understanding of moral development will help us come to grips with many real-life issues and problems. Few people have given more thought to the implications of Kohlberg's work than Thomas Lickona, an expert on moral development and editor of a major work on the subject (Lickona, 1976). We invited Dr. Lickona to write an essay relating recent research on moral development to practical human concerns. His essay appears in Selection 7.

TABLE 12–3
KOHLBERG'S SIX STAGES OF MORAL DEVELOPMENT

PRECONVENTIONAL LEVEL

STAGE 1:

Punishment and obedience orientation. The physical consequences of an action determine whether it is good or bad. Avoiding punishment and bowing to superior power are valued positively.

STAGE 2:

Instrumental relativist orientation. Right action consists of behavior that satisfies one's own needs. Human relations are viewed in marketplace terms. Reciprocity occurs, but is seen in a pragmatic way, i.e., "you scratch my back and I'll scratch yours."

CONVENTIONAL LEVEL

STAGE 3:

Interpersonal concordance (good boy—nice girl) orientation. Good behaviors are those that please or are approved by others. There is much emphasis on conformity and being "nice."

STAGE 4:

Orientation toward authority ("law and order"). Focus is on authority or rules. It is right to do one's duty, show respect for authority, and maintain the social order.

POSTCONVENTIONAL LEVEL

STAGE 5:

Social-contract orientation. This stage has a utilitarian, legalistic tone. Correct behavior is defined in terms of standards agreed upon by society. Awareness of the relativism of personal values and the need for consensus is important.

STAGE 6:

Universal ethical principle orientation. Morality is defined as a decision of conscience. Ethical principles are self-chosen, based on abstract concepts (e.g., the Golden Rule) rather than concrete rules (e.g., the Ten Commandments).

TABLE 12–4
THE TYPE OF MORAL REASONING EMPLOYED AT VARIOUS STAGES IN RESPONSE TO THE PROBLEM OF HEINZ

STAGE 1

Action is motivated by avoidance of punishment and "conscience" is irrational fear of punishment.

Pro—If you let your wife die, you will get in trouble. You'll be blamed for not spending the money to save her and there'll be an investigation of you and the druggist for your wife's death.

Con—You shouldn't steal the drug because you'll be caught and sent to jail if you do. If you do get away, your conscience would bother you thinking how the police would catch up with you at any minute.

STAGE 2

Action motivated by desire for reward or benefit. Possible guilt reactions are ignored and punishment viewed in a pragmatic manner. (Differentiates own fear, pleasure, or pain from punishment-consequences.)

TABLE 12–4 (continued)

Pro—If you do happen to get caught you could give the drug back and you wouldn't get much of a sentence. It wouldn't bother you much to serve a little jail term, if you have your wife when you get out.

Con—He may not get much of a jail term if he steals the drug, but his wife will probably die before he gets out so it won't do him much good. If his wife dies, he shouldn't blame himself; it wasn't his fault she has cancer.

STAGE 3

Action motivated by anticipation of disapproval of others, actual or imagined-hypothetical (e.g., guilt). (Differentiation of disapproval from punishment, fear, and pain.)

Pro—No one will think you're bad if you steal the drug but your family will think you're an inhuman husband if you don't. If you let your wife die, you'll never be able to look anybody in the face again.

Con—It isn't just the druggist who will think you're a criminal, everyone else will too. After you steal it, you'll feel bad thinking how you've brought dishonor on your family and yourself; you won't be able to face anyone again.

STAGE 4

Action motivated by anticipation of dishonor, i.e., institutionalized blame for failure of duty, and by guilt over concrete harm done to others. (Differentiates formal dishonor from informal disapproval. Differentiates guilt for bad consequences from disapproval.)

Pro—If you have any sense of honor, you won't let your wife die because you're afraid to do the only thing that will save her. You'll always feel guilty that you caused her death if you don't do your duty to her.

Con—You're desperate and you may not know you're doing wrong when you steal the drug. But you'll know you did wrong after you're punished and sent to jail. You'll always feel guilt for your dishonesty and lawbreaking.

STAGE 5

Concern about maintaining respect of equals and of the community (assuming their respect is based on reason rather than emotions). Concern about own self-respect, i.e., to avoid judging self as irrational, inconsistent, nonpurposive. (Discriminates between institutionalized blame and community disrespect or self-disrespect.)

Pro—You'd lose other people's respect, not gain it, if you don't steal. If you let your wife die, it would be out of fear, not out of reasoning it out. So you'd just lose self-respect and probably the respect of others too.

Con—You would lose your standing and respect in the community and violate the law. You'd lose respect for yourself if you're carried away by emotion and forget the long-range point of view.

STAGE 6

Concern about self-condemnation for violating one's own principles. (Differentiates between self-respect for general achieving rationality and self-respect for maintaining moral principles.)

Pro—If you don't steal the drug and let your wife die, you'd always condemn yourself for it afterward. You wouldn't be blamed and you would have lived up to the outside rule of the law but you wouldn't have lived up to your own standards of conscience.

Con—If you stole the drug, you wouldn't be blamed by other people but you'd condemn yourself because you wouldn't have lived up to your own conscience and standards of honesty.

Source: Rest, 1968.

SELECTION 7

MORAL DEVELOPMENT AND THE PROBLEM OF EVIL

Thomas Lickona

Nothing is more disturbing, or more challenging for a theory of moral development, than the problem of evil. Its scope is staggering. Morris Abram (1971), for example, described the horrors of the Vietnam War as part of a "century of massacre":

> Beginning with the pogroms in Russia and the genocide of the Armenians, the century has witnessed the killings and deportations of World War I, the Stalin ravages of the Kulaks, the Japanese pillage of China, and the unparalleled massacres by Hitler. . . . The Indonesian revolution in the 1960s was accompanied by at least a half-million deaths inflicted by the most unspeakable means. Less than three years ago, the Ibos were decimated by sword, gun, and noose. Now, again, the Indian subcontinent is wracked with death. [P. 9]

How does one make sense out of evil on such a scale? One explanation traces the problem to a basic behavioral tendency to obey authority, however malevolent. Stanley Milgram (1963) observes that from 1933 to 1945, millions of innocent persons were systematically slaughtered on command: "Gas chambers were built, death camps guarded, daily quotas of corpses were produced with the same measure of efficiency as the manufacture of appliances. These inhumane policies may have originated in the mind of a single person, but they could be carried out on a massive scale only if a very large number of persons obeyed orders" (p. 371).

Milgram's estimate of the human tendency to submit to authority received chilling confirmation from his own well-known experiments. In his original study (1963), he investigated whether subjects would follow an experimenter's instructions to increase what they believed to be painful electrical shock to a "learner" each time he made a mistake in a memorization task. Despite the fact that the experimenter had no power to enforce his commands, an astonishing twenty-six of the forty subjects obeyed to the end and administered the full complement of 450 volts of shock.

Ten years after Milgram's experiment, the U.S. Senate hearings on Watergate provided fresh evidence of the same pattern of submission. "I believed he had the authority to do it," one participant in the scandal said. Testified another: "I was there to follow orders, not to think" (*New York Times*, June 30, 1974, p. 10).

Equally frequent and distressing are reports of another kind of moral passivity: the failure of bystanders to come to the aid of a person in desperate need of help. During the last decade, events like the following became commonplace:

> Wolfgang Friedmann, a Columbia University law professor, was mugged and stabbed on the streets of New York City. He died. The *New York Times* editorialized: ". . . for some time passersby stared and went on their way before any fellow human being had the decency to call the police. Creatures of the jungle could not be more unfeeling." [September 22, 1972, p. 42]

Is there a common factor that links the willingness to follow an authority's command to do evil to others and the unwillingness to help a person in distress? A statement by one of Milgram's subjects (1965) provides a clue. After delivering 180 volts of shock, at which point the learner screamed in agony and shouted that he could stand it no longer, the subject turned to the experimenter and said:

> He can't stand it. I'm not going to kill that man in there. You hear him hollering? What if something happens to him? . . . I mean I refuse to take responsibility. He's getting hurt in there . . . I mean who's going to take responsibility if anything happens to that man? [P. 67]

The experimenter replied, "I will". The subject shrugged his shoulders, said "All right," and continued to increase the voltage (Milgram, 1965, p. 67).

Both obedience to authority and indifference to another's plight seem to reflect an abdication of personal moral responsibility. The Milgram subject who says, "Who is going to take responsibility?" is like the unresponsive bystander who says, "I don't want to get involved."

What accounts for this phenomenon? Does the explanation lie in external factors that encourage people to be automatons or isolationists in their moral functioning? How does one explain the fact that some people do *not* obey malevolent authority and some *do* intervene to help their fellow human beings?

A DEVELOPMENTAL THEORY: STAGES OF MORAL REASONING

One theory, advanced by Lawrence Kohlberg (1969, 1971, 1976), holds that among the factors determining an individual's moral behavior is his stage of moral reasoning. In Kohlberg's view, there is not simply one attitude toward the dictates of authority or the needs of people in distress, but rather six—each corresponding to one of six sequential stages of moral reasoning. The key ideas about Kohlberg's stages are these:

1. The core of morality is justice. Justice requires a person to treat all human beings with respect and fairness, to consider every person's rights or needs equally and impartially. The six stages of moral reasoning represent progressively better—more consistent and more fully worked out—applications of the principle of justice. The higher stages are thus not only chronologically later but more adequate than the lower stages for dealing justly with moral conflicts.
2. The six stages have been defined on the basis of Kohlberg's cross-cultural research in several countries, experimental studies in accelerating moral stage development, and a longitudinal investigation of fifty boys that has been in progress since the 1950s (Kohlberg, 1969, 1976). The stages have been identified by probing the reasoning behind how a subject resolves moral dilemmas: For example, should a doctor give a lethal dose of morphine to a fatally sick woman who demands to be put out of her pain? Why or why not?
3. Each stage is a general mode of thinking, involving some consistency in moral reasoning across different moral dilemmas. Most people, however, use more than one stage of thinking in dealing with various moral problems.
4. The stages are actively constructed by the individual as he tries to make sense out of his social experience, rather than directly implanted by the culture through socialization.
5. The stages are universal. All cultures come to grips with the same basic moral issues, such as rules, authority, fairness, punishment, honesty, and the value of life. And all individuals, regardless of culture, go through the same stages of reasoning about the moral issues in the same order. People and cultures differ, however, in how quickly they develop and how far they progress in the stage sequence.

How do Kohlberg's six moral stages apply to the problems of obedience to authority and unresponsiveness to the plight of a person in need?

At *Stage 1,* the first of what Kohlberg calls the "preconventional" stages, right is equated with overt obedience to superior power. There are no limits on what authority can command. Fourteen-year-old Joe, who has worked hard to save up for a bicycle, should turn over his money to his father when the latter demands it: "It's his father; he owns him; he has to do what he says" (Kohlberg, 1971, p. 196).

At this stage, only the powerful are seen as being responsible for the welfare of people. Ordinary persons are responsible for helping only when commanded to do so by their superiors or by very definite rules. The dying professor in the streets of New York is a problem for the authorities, not the responsibility of a mere passerby.

An individual at Stage 1 denies responsibility for others even when he is the cause of harm; those in charge are to blame. The experimenter who ordered the electrical shock is responsible, not the subject who pulled the lever. "It would be pointless to blame me," Adolph Eichmann said; "I was merely a little cog in the machinery that carried out the directives of the German Reich" (quoted in Kohlberg, 1969, p. 383).

At *Stage 2,* the individual does not perceive authorities as having any special qualities deserving respect, and he makes decisions about whether to obey on the basis of self-interest. Quitting or continuing with Milgram's experiment would depend on which course of action would cause less trouble for the subject. Moreover, Stage 2 believes that people should look out for themselves. You shouldn't interfere with their rights, but neither are you obligated to take action on their behalf. The learner in the Milgram study should have known what he was getting into; the mugging victim should have been more cautious.

At Stage 2, however, a limited kind of responsibility does emerge: the individual feels responsible for those he selfishly needs or "owes" from whom he could get a favor in return. If the mugging victim were the passerby's wife or husband, or someone likely to reward a Good Samaritan, then intervention might be warranted.

At *Stage 3,* the first of the "conventional" stages, the you-scratch-my-back-and-I'll-scratch-yours ethic broadens into a less contingent concern for the welfare of others. The Stage 3 individual feels obligated to do whatever a "nice" person would do, regardless of whether there is anything in it for him.

Stage 3 naively trusts that authority is wise and has everyone's best interest at heart. The Milgram experimenter wouldn't allow serious harm to come to a subject. Finally, active reponsibility for others tends to be limited to those to whom one has immediate personal or group ties. A Stage 3 sympathy might motivate helping the casualty in the city streets, but then again, the victim is a stranger to the passerby; others would understand if he did not stop.

At *Stage 4,* the person believes that authority should be respected so that people will respect rules and society. To be legitimate, however, authority must maintain respect by symbolizing morality and living up to its role. A subordinate has no right to refuse a command of a legitimate authority, even if the subordinate thinks the order unwise or unjustified; "my country, right or wrong" is Stage 4 thinking. Obedience in the Milgram study, however personally uncomfortable, may be seen as necessary if the experimenter is viewed as a legitimate authority figure.

Responsibility for others at Stage 4 becomes a sense of duty within a larger social system that assigns responsibility to all its members. In general, being a good citizen requires helping other members of the social system, such as the stranger lying wounded in the street. But Stage 4 responsibility is also limited; you shouldn't take over a role of helping that is assigned by society to someone else; you are responsible only to help decent law-abiding citizens; you should never take the law into your own hands or challenge authority in order to help someone; and you are not required to help someone who is not part of your social or authority system.

Stage 5 is the first of what Kohlberg calls the "postconventional" moral stages, because they are based on "rational" considerations of moral obligation rather than on external social definitions of right and wrong. At Stage 5 an authority has a right to command because of an implicit contract between authority and subordinates that is signified by their agreement to be part of a given role system. A Stage 5 subject may feel obligated to follow the instructions of the Milgram experimenter because both the "teacher" and the "learner" made a voluntary commitment to participate in the experiment. On the other hand, a contract at Stage 5 is viewed as limited by a wider system of "natural" or universal rights. Focusing on the rights of the learner being shocked, the Milgram subject may decide to refuse to continue, as several did (Milgram, 1963).

Concern for others at Stage 5 is universalized to include the welfare of all human beings. One would be obligated to help the mugging victim no matter who he was, just as the Good Samaritan in the ancient parable came to the aid of a Jew in a land where Samaritans were traditionally despised. If there is no legal way to help another, however, a Stage 5 person feels no obligation to use illegal means to do so.

At *Stage 6,* the "buck stops" with the person who must act. No authority, social role, or contract can define the moral choice for the actor. Decisions must be made by the individual on the basis of a fully universalized respect for human rights and dignity. This principle of respect is obviously violated by giving electrical shock to a protesting victim or by failing to aid a man who is dying in the street. One also feels responsible at Stage 6 for avoiding unjust harm to others even in the course of carrying out one's duties, be they prescribed by a commanding officer or by a president.

Although people vary considerably in when they reach a particular stage, the first three stages typically emerge during the years five to twelve; Stage 4 is ordinarily constructed some time during adolescence; and the postconventional stages are not developed until after twenty years of age (Kohlberg, 1976). Only about 25 percent of adults in Western societies ever reach State 5 or 6 (Kohlberg and Turiel, 1971).

Research by Kohlberg and his colleagues (Kohlberg, 1976, and in preparation) in both naturalistic and experimental settings sheds light on what stimulates movement through the developmental sequence. Effective conditions include experience that precipitates moral uncertainty, exposure to conflicting points of view that include reasoning one stage above a person's own level, and active participation in social relations and groups that foster taking the role or perspective of others. Institutionalized children who are deprived of role-taking opportunities, for example, show retarded moral reasoning development, whereas children growing up in a highly participatory community like the Israeli kibbutz show advanced development on Kohlberg's scale (Kohlberg, 1976).

DOES MORAL REASONING PREDICT MORAL BEHAVIOR?

Since people do not always do what they "know" is right, it is natural to ask if an individual's stage of moral reasoning really predicts how he or she will act in a moral situation. Kohlberg (1970) gave his moral judgment scale to students who had participated in Milgram's obedience experiments. He found that 75 percent of a small group of subjects who used at least some Stage 6 thinking quit the experiment, compared with only 13 percent of subjects at lower moral stages.

McNamee (1968) investigated the relation between moral reasoning and behavior in a situation that forced a subject to choose between accommodating to a Milgram-type authority figure or helping a person in distress. As the volunteer in McNamee's study was about to be interviewed, a distraught young man (a confederate) interrupted to say that he was scheduled to be the next participant in the study but could not do it because he had just had a very bad trip on psychedelic drugs. He asked the experimenter to help him, but the experimenter, obviously annoyed, said he was not a therapist and told the individual to reschedule his appointment. After another unsuccessful plea for help, the young man left the room.

Only 44 percent of all subjects witnessing the experimenter's callousness sought to aid the distressed individual. Of those who had been classified as Stage 2 on Kohlberg's dilemmas, only 11 percent helped. At this stage subjects commonly defended their nonintervention by saying that the drug user "should have considered the consequences before taking the drugs." Of the Stage 3 subjects, 27 percent offered assistance. Here the most frequently given reason for not helping was fear of the experimenter's disapproval. At Stage 4, 38 percent helped, with nonhelpers citing a sense of role obligation—"You're the experimenter, I'm the subject"—as the reason for not intervening. At Stage 5, 58 percent of subjects offered aid, and at Stage 6 fully 100 percent responded to the appeal for help. One Stage 6 subject said to the experimenter in a subsequent interview, "I did feel a strong obligation to complete the experiment and not waste your time. But that did not take precedence over something important like this" (McNamee, 1968, p. 16).

BEYOND REASONING

Do Kohlberg's stages explain the problem of evil? Observation (Lickona, 1976) suggests that there is more to the dark side of human character than simply a low level of moral reasoning. People not only ignore others in need or cause suffering on command but also demonstrate a capacity to enjoy the pain of others and to inflict cruelties that go well beyond the requirements of malevolent authority. Rudolf Hess, commandant of the Nazi concentration camp at Auschwitz, had a window installed in a gas chamber so he could watch the gruesome massacres (Andrus, 1969). Adolph Eichmann confessed that the death lists were his favorite reading before he went to sleep (Wechsberg, 1967). And the ovens were merciful compared to other common forms of killing prisoners, such as kicking them to death with boots or turning loose vicious police dogs trained to eat live human flesh (Shenker, 1974).

Such horrors are by no means the exclusive province of Nazi Germany. The machines of torture and death can be found around the world. Styron (1973), for example, describes the treatment of prisoners in the American-supported jails of South Vietnam's former President Thieu. Men were kept in "tiger cages"—stone cells twenty inches to four feet high—"confined for years in sunless starvation, crippled forever if they survived" (p. 19). Others "were thrown in nests of red ants, or had hot melted rubber poured into their navels, or were put in a sack and plunged into boiling water, or were whipped raw, soaked in salt, and left in the blazing sun for days" (p. 20). Such torture of political prisoners, Styron reports, is "epidemic" and is used in many countries as a deliberate instrument of government policy.

It may be, as Kohlberg (1971) suggests, that the greatest evil in history has been perpetrated by persons with a strong ego who "drop out" of the moral system, considering themselves "beyond morality." But barbarities are too common to be laid at the doorstep of demented tyrants.

What is perhaps most disturbing about a phenomenon such as Charles Manson, for example, is the ease with which he converted his young followers into killers who murdered their victims with relish, and the fact that after his imprisonment he received a huge volume of love letters from young girls wanting to join the family and was named "Man of the Year" by an underground newspaper (Woods, 1975).

A low stage of moral reasoning may be a prerequisite for doing harm to others, but it clearly finds potent allies in human sadism and the attraction to evil as a form of power. Any effort to reduce the evil people do to each other must therefore develop not only their ability to reason clearly about the rights of human beings but also their capacity to feel compassion, not pleasure, in the face of another's pain.

FOSTERING MORAL DEVELOPMENT

In addition to its provocative and disturbing examples of repugnant moral behavior, Lickona's analysis clearly raises the question of how positive moral development can be fostered. In this section we will examine recent evidence pertinent to this issue.

Correlational studies A survey of correlational evidence (Hoffman, 1975) supports the view that *inductive discipline*, the use of techniques that point up the consequences of the child's behavior for others, leads to a moral code that is internally based and *not* dependent on external sanctions. *Power assertive discipline*, the use of physical force or imposing of material deprivation, seems to lead to a shallow morality based on fear of external detection and punishment for doing the wrong thing.

Experimental studies To date, experimental studies of moral development have been disappointingly limited in their scope, focusing almost exclusively on the short-term effects of social example. Unsurprisingly, these investigations have almost all suggested that children will change their own moral judgments after being exposed to models who display a higher level (in Kohlberg's sense) than the individual children originally displayed (Bandura and McDonald, 1963; Cowan, Langer, Heavenrich, and Nathanson, 1969; Le Furgy and Woloshin, 1969), and this type of training often generalizes to new situations (Glassco, Milgram, and Youniss, 1970).

Moral development and the schools Kohlberg's work, together with the experimental social learning work and increased interest in building a fair and egalitarian society, has reawakened debate as to whether schools, especially public schools, could or should provide moral education. The reason for answering no to these questions is of course that moral values vary considerably within our culture, so there might be too little agreement on what to teach. Kohlberg's suggestion that moral reasoning is independent of a particular content—i.e., there are no right and wrong answers in Kohlberg's scheme (see Table 12–4)—means that moral education or "values clarification" could be considered as a legitimate part of secular education and under this banner has been reintroduced into public schools without challenging subcultural or religious differences. Fiske (1975) provides this example:

> At the Gould Avenue School in North Caldwell, N.J., Judy Tuttle's first grade class recently watched a filmstrip of a story involving children about to go on a boat ride. The captain, called away for a moment, instructed the children to stay off the boat and he left Patrick in charge. Some of the children disobeyed. When the captain returned, Patrick faced the dilemma of whether to tell what happened—and risk the trip for all concerned—or to keep silent.
>
> After the filmstrip the teacher said there was "no right or wrong answer," and she invited the children to give their views. One said Patrick should tell the truth because lying is wrong. Another advocated silence because "it's not nice to tattle." A third asked, "What about the children who didn't go on the boat?"
>
> Miss Tuttle asked whether there might be "a fairer rule." A girl replied, "Only those who went on the boat shouldn't go." The discussion ended with instructions for the children to draw pictures of what they thought should happen.

It would seem, then, that the schools can make a valuable contribution to the child's moral development. More important, this instruction can be almost value free, in the sense that children can be sensitized to the presence of moral issues in their behavior without necessarily being indoctrinated with a particular set of standards.

SUMMARY

Self-control, achievement strivings, and moral judgment all involve a self-imposed standard of some sort, and the basic processes of learning and cognition are relevant to the development of all values.

Two aspects of self-control that have been studied are *resistance to temptation* and *delay of gratification*. The findings indicate that young children whose mothers preferred physical discipline were more likely to resist the temptation to cheat in a game than were children of mothers who preferred other methods. Older children, however, deviated less than younger ones when punishment plus a reason was provided, but they deviated more than younger children when only punishment was provided. Moral reasoning was also found more effective than verbal punishment in preventing deviation. Delay of gratification involves two steps: an initial decision to wait, and then an effort to maintain one's resolve. Modeling plays an important part in the first step, and not being exposed to the desired object or being able to think of "fun things" can help keep the resolve while waiting.

Several studies have shown that the achievement standards children set for themselves are strongly influenced by the kind of behavior they observe, but verbalizations of rules that are not modeled by adults will probably be ignored. Self-administered rewards have been found to be as effective as rewards administered by an adult. Children differ in the extent of their achievement striving and also in the type of activities in which they try to excel. Among the factors in child rearing that seem to encourage achievement striving are warm and encouraging mothers, independence training, reward of achievement efforts, and instigation of intellectual pursuits. The degree to which a child *expects* to succeed and the degree to which he or she feels control over the situations encountered have a major bearing on actual success.

Although children express consistency in verbal responses about honesty, studies suggest that consistency is not shown behaviorally. Kohlberg has identified three levels of moral thinking, each level consisting of two stages. Lickona explains how Kohlberg's six stages apply to the problems of obedience to authority and unresponsiveness to the plight of a person in need. The type of discipline one receives is related to moral development. Inductive discipline can lead to a moral code that is internally based and not dependent on external sanctions, whereas power assertive discipline can lead to a shallow morality based on fear of external detection.

The Intellectually Exceptional

CHAPTER 13

OUTLINE

MENTAL RETARDATION
- Prevalence
- Labeling
- Characteristics
- Etiology
- Social and Emotional Factors in Mental Retardation
- Social Skills and Intellectual Functioning
- Education of the Retarded

THE INTELLECTUALLY GIFTED
- Selection 8—The Discovery and Encouragement of Exceptional Talent
- Education of the gifted

CREATIVITY
- Relationship Between School Performance and Life Accomplishments
- Defining and Measuring Creativity
- Wallach's Studies
- Fostering Creativity

SUMMARY

In Chapter 8 we discussed the concept of intelligence and traced the usual course and development of intellectual abilities. We also noted that there are stable differences in these abilities, among both children and adults. Usually these differences are relatively minor, falling within a normal range of competence that creates no special problems or needs. Sometimes, however, a child differs from others so much intellectually that he or she is considered truly exceptional. This chapter is devoted to such intellectual exceptionality—its definition, causes, and the special demands that it may place on the individual and society.

Often the term *intellectually exceptional* is used as a synonym for mental retardation. We shall discuss retardation, but it is not the only type of intellectual exceptionality. The very bright and the very creative are also exceptional, and psychologists have thus had a special interest in their development as well.

MENTAL RETARDATION

"Mental retardation," according to the American Association on Mental Deficiency, is "subaverage intellectual functioning which originates during the developmental period and is associated with impairment in adaptive behavior" (Heber, 1961, p. 3). The inclusion of the word *adaptive* is important here and helps us take cultural setting into account —an individual capable of adaptive behavior in a rural setting might experience much greater difficulties in the maze known as New York City.

PREVALENCE

It is often estimated that 6 million Americans, or 3 percent of the total population, are classified as retarded (Scheerenberger, 1964; Robinson and Robinson, 1970), but the present AAMD definition has been interpreted to include a much larger figure. Such a discrepancy is not new; Windle (1958) noted that from 1894 to the time of his article, estimates of the prevalence of mental retardation ranged from .05 to 13 percent. Because judgments are invariably affected by the demands of the environment, it is impossible to declare any one figure to be more correct than another. Ultimately, it might be most appropriate to limit judgments of retardation to particular settings (e.g., "His

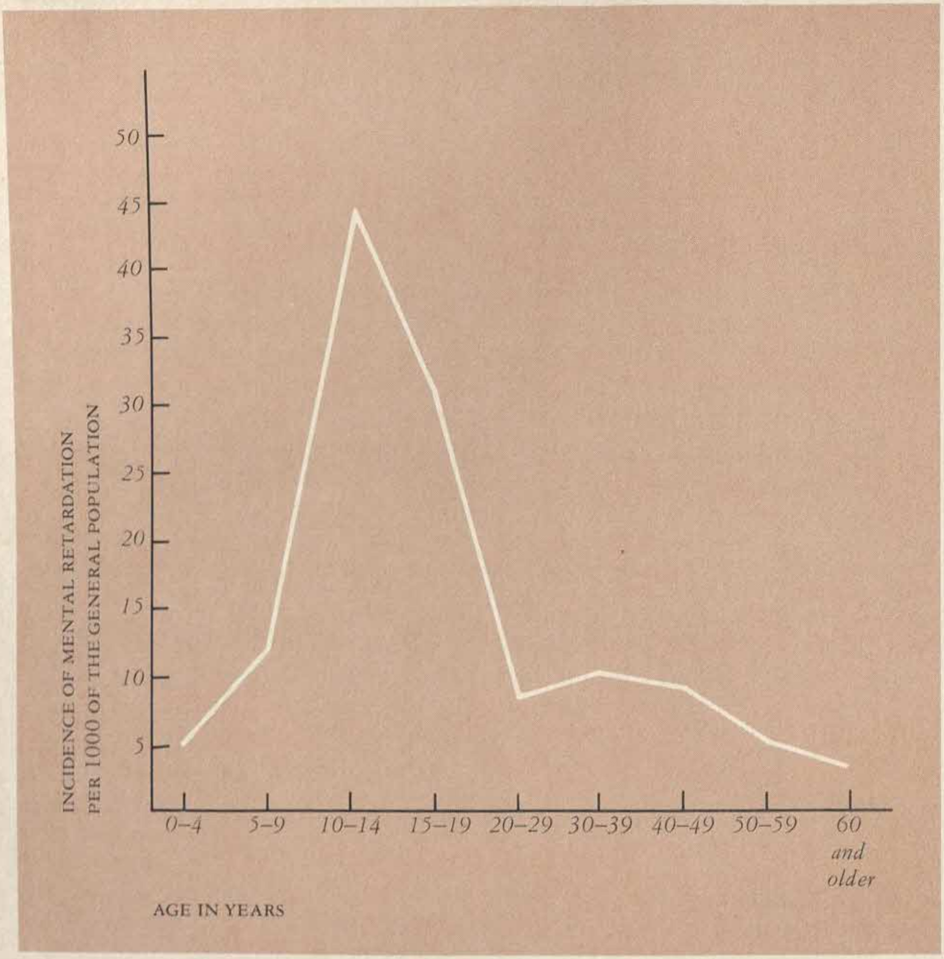


FIGURE 13-1
Relative frequency of being labeled mentally retarded as a function of age. Note that school-age children are particularly likely to be termed retarded. Adapted and reprinted with permission from N. O'Connor and J. Tizard, *The Social Problems of Mental Deficiency*, copyright 1956, Pergamon Press Ltd.

conduct is too retarded for him to function effectively in a fourth-grade classroom"). Preschool children rarely are termed retarded; the same is true for adults who are out of school and who manage to avoid encounters with police and other societal agents. However, the abstract conceptual and verbal proficiency required of school-age children, together with the fact that most wide-scale IQ testing is done during this period, results in a larger percentage of the population being termed retarded during the school years than at any other time (Granat and Granat, 1973). Figure 13-1 shows the usual pattern.

LABELING

Historically, the terms designating intellectually slow individuals have varied considerably. Over the past fifty years, however, it has been generally agreed that three levels of retardation should be distinguished;

only the labels have varied according to time and setting. The terms *moron, imbecile,* and *idiot,* for example, were once acceptable designations for retarded individuals. Today the AAMD uses the terms *mild, moderate,* and *severe and profound* to refer to substantially the same categories. Current labels used by U.S. educators reflect more completely the school capabilities of each group; here we find that *educable* (EMR), *trainable* (TMR), and *custodial* levels of retardation are distinguished. Table 13-1 shows the parallels, along with the generally accepted IQ range for each category.

These variations in labeling do not appear just because of linguistic fashion or whimsy. Label changes often serve the beneficial purpose of helping to overcome prejudices and stereotypes that accumulate over time. It has been shown, for example, that children labeled as slow learners are judged more favorably than those termed mentally retarded (Hollinger and Jones, 1970).

TABLE 13–1
TERMINOLOGY USED TO DESCRIBE THE MENTALLY RETARDED

IQ RANGE*	50–69	25–49	BELOW 25
Early labeling in the U.S.	moron	imbecile	idiot
AAMD and World Health Organization	mild	moderate	severe and profound
Current educational labeling (U.S.)	educable	trainable	custodial

*The particular IQ ranges employed for any label may vary slightly from those shown.

CHARACTERISTICS

As a group, mentally retarded children are slow to walk, talk, and feed themselves. They also take unusually long periods of time before they are toilet-trained. In the more severe cases, retardation extends to almost all areas of anatomical, motor, and verbal development. Because intellectually normal children also may display one or more of these indicators, it usually is not assumed that a young child is retarded unless an extensive pattern of deficits is present.

By far the largest group of retarded individuals have IQs that range from 50 to 69; classified as mildly or educably mentally retarded, they are rarely institutionalized. Of course even with this mild level of retardation a child will have a difficult time in school and is likely to lag behind intellectually average children of the same age. An educably retarded youngster can acquire many of the academic skills mastered by elementary school children but reaches this level of achievement at a later age.

There are many jobs that the mildly retarded are quite capable of filling; they have become welders, miners, painters, tailors, and the like. It has been found that their out-of-school success usually depends more on social skills than on occupational ones (Telford and Sawrey, 1972). Thus, parents of these children must avoid the temptation to foster dependency, sloppiness, and other socially undesirable characteristics, "excusing" them because of intellectual deficit.

> Many jobs are sufficiently simple so that they can be rather readily mastered. If the individual has learned the value of promptness, good manners, good appearance, and dependability, he can function in a large number of jobs without too much difficulty. The social training necessary for the development of such characteristics should start early and be intensive enough so that he develops patterns of social response that will become assets rather than liabilities as he matures. Frequently the mentally retarded learn at home precisely the social behavior which will add to the burden of being mentally retarded rather than assist . . . in social adaptation. [Those social characteristics] which are accepted as part of socialization, are often lacking in the mentally retarded *simply because they have not received the systematic training by which these are acquired.* [Telford and Sawrey, 1972, p. 245, italics added]

The moderately or trainably retarded, with IQs ranging from 25 to 49, are usually unable to hold jobs except within sheltered workshops; they rarely marry and usually are institutionalized.

For the severely and profoundly retarded—with IQs below 25—institutionalization is virtually inevitable. Among these individuals, interpersonal communication is minimal or entirely lacking, and learning even the simplest kind of self-care often proves extremely difficult or downright impossible.

ETIOLOGY

Although the causes of mental retardation vary considerably, two distinct etiological categories have been identified and can help us understand the range of characteristcs and abilities displayed by retarded individuals.

Familial mental retardation is said to account for roughly 80 percent of all mental deficiency. A familially retarded child may be viewed as having an IQ within the lower range of the normal IQ distribution. As we would expect from this distribution, most children in this category are only mildly retarded, with IQs ranging from 50 to 69 (the upper limit is sometimes placed as high as 85). They are physically normal and have no history of brain damage or neurological defect.

Biologically caused mental retardation, as the name implies, is caused by some particular biological damage or defect. These include chromosomal anomalies such as Down's syndrome (mongolism) and gene defects such as phenylketonuria, both of which were discussed in Chapter 4, as well as brain damage caused by infectious disease, oxygen deprivation, or physical trauma. Most, though not all, individuals with IQs below 50 would appear to be in this category.

SOCIAL AND EMOTIONAL FACTORS IN MENTAL RETARDATION

If mental retardation is thought of as simply an intellectual disadvantage, then little attention is given to the way in which it may be intertwined with social and emotional factors. Yet it is clear that these other factors are important, for biological as well as familial retardation. Regardless of the depth or cause of a child's intellectual disability, the home environment and the incentives provided to learn important skills can do much to relieve the problem—or make it worse.

Home environment In previous chapters we have seen repeatedly that a child's home environment plays a primary role in all aspects of social and emotional development. It is not surprising, therefore, to discover that some distinct patterns of home and family environment accompany retardation. The President's Task Force on Manpower Conservation (1964) found that the families of draftees rejected for intellectual deficits were characterized by poverty and poor education. Benda, Squires, Ogonik, and Wise (1963) indicated that among 205 retardates with IQs greater than 50, the majority had another retardate in the immediate family and three-quarters of the families either were separated or were not able to provide even bare necessities. Other family factors related to retardation include low achievement motivation of the parents, father's absence, lack of appropriate sex-role models, impoverished financial status, and low emphasis on education (Chilman, 1965; Robinson, 1967; Robinson and Robinson, 1970).

A rather specific role that early home experiences may play in retardation has to do with the child's motivation. Retarded children, it has been suggested, may have more frequently been neglected by adults in their early lives and therefore crave attention and praise to a greater degree than their mental age alone would predict. To test this formulation, Zigler and Balla (1972) compared the influence of social praise on the behavior of normal and retarded children of mental ages seven, nine, and twelve, predicting that younger and retarded children, if given praise, would continue to perform a boring task for a longer time than older and normal individuals. The results confirmed their expectation; younger children performed the boring task longer than older ones and retarded children persisted more than normals. Especially striking was the finding that even the oldest retardates performed the boring task for a greater period of time than the youngest normal children.

And, finally, the home environment may influence the most important decision of all: whether the child is institutionalized. Studies have shown that, for brighter retardates, institutionalization is much more likely when the home environment has been inadequate than when parents have been able to provide the attention and care needed by these children (Zigler, 1968).

Educational environment All education is based on incentives of one sort or another, but it has been suggested that retarded children may be motivated by different incentives than are the typical middle-class youngsters, whose needs and tastes determine so many of our educational practices. Zigler and de Labry (1962) found clear support for this possibility, in an experiment that was later recapped this way:

> These investigators tested middle-class, lower-class, and retarded children *equated on MA* on a concept-switching task . . . under two conditions of reinforcement. In the first condition . . . the only reinforcement dispensed was the information that the child was correct. In the second condition, the child was rewarded with a toy of his choice if he switched from one concept to another. In the "correct" condition . . . retardates were poorer in the concept-switching than were middle-class children. . . . [But] in the toy condition this inferiority disappeared, and retarded and lower-class children performed as well as the middle-class children. [Zigler, 1968, p. 590]

If material incentives are particularly important for retarded children, as Zigler and de Labry's findings suggest, then it becomes essential to determine what type of incentive conditions are most effective. Addressing this question, Talkington (1971) trained educable mentally retarded adolescents to perform a rather complex motor task under four incentive conditions. In the *reward only* condition, students simply received a token reward (later exchangeable for money) for each correct response; in the *response cost* condition, participants received twenty tokens as a sort of legacy at the beginning of each training session but lost one token for each error; youngsters in the *reward and cost* condition received ten tokens at the beginning of each session and subsequently received a token for each correct response but lost one for each error; finally, subjects in the *no reward, no cost* condition served as a control group and received no incentives.

Talkington's results were very clear. The *response cost* condition was by far the most effective way to teach these youngsters, and it resulted in fewer errors than reward alone regardless of whether it was used by itself or combined with reward. What is more, performance was at essentially the same level for the *response cost* and *reward and cost* groups, indicating that the reward element provided no additional motivation beyond that of avoiding error. Talkington interprets the token removal procedure as a failure experience and suggests that the *response cost* technique was so highly effective for these retarded youngsters precisely because it elicited their strong motivation to avoid failure.

The theoretical significance of Talkington's study is that it meshes with a considerable body of earlier evidence showing that retarded persons are generally more motivated to avoid failure than to achieve success (Cromwell, 1963; Zigler, 1968). The underlying process appears to arise from that fact that retarded individuals have a background of many failures. As a result, the desire to avoid failure is particularly important for them when faced with a new problem. Retarded children are therefore more likely than normal children of the same *mental* age, that is, their intellectual peers, to "settle for" poor performance even when they can do better (Stevenson and Zigler, 1958). Building positive self-concepts and reducing the overwhelming motive to avoid failure is, or at least should be, a high priority goal for anyone teaching retarded children.

SOCIAL SKILLS AND INTELLECTUAL FUNCTIONING

A question that frequently arises regarding intellectual retardation is whether it constrains the development of appropriate social skills. There is a clear correlation between mental age and social competence (Copobianco and Cole, 1960; Goulet and Barclay, 1963). It has been argued, though, that the relationship may not be a direct result of mental retardation. Perhaps, for example, it is not mental retardation itself but the failure to train retarded children in more advanced social skills that gives rise to the correlation (Gunzburg, 1965).

Severy and Davis (1971) have provided evidence that supports this view. They studied helping behavior of normal and retarded children under conditions in which the retarded children were "in a milieu containing models of and rewards for helping behavior" (p. 1019). There was no evidence of a deficit in helping behavior among retarded children in this situation; in fact, the older retardates actually attempted to give help more often—and succeeded in helping as often—as any of the groups of intellectually normal children.

Even among severely retarded children, careful and systematic use of modeling and reinforcement can be used to cultivate positive social skills and interactions. In one study (Paloutzian, Hasazi, Streifel, and Edgar, 1971) severely retarded children were trained in such tasks as passing a beanbag to another child or pulling another child cooperatively on a wagon. Before these experiences the children had made no attempt to interact with others and simply played aimlessly by themselves; after training, the children began to observe the play of more advanced peers and in some cases initiated appropriate interactions themselves.

Unfortunately, behaviors developed in severely retarded children through such special training will often disappear if reinforcement is not continued. Following up a one-year training program in social competence skills, Lawrence and Kartye (1971) found that the severely and profoundly retarded girls who participated had lost most of their earlier gains in communication and social skills within four months, although most of the self-help skills learned during the program were retained. The results suggest, then, that either long-term training or continued external reinforcement, perhaps both, are needed in training severely retarded children to adapt socially. On the other hand, the findings also suggest that the task *can* be accomplished.

EDUCATION OF THE RETARDED

In the past there was considerable controversy as to whether society had a responsibility to educate its intellectually less able members, but it is now widely agreed that special education or enriched educational opportunities should be provided for the mentally retarded. Increasingly, siginificant sums of money are being spent in order to accomplish this end as effectively as possible.

There are four broad possibilities for education of the retarded: placement in regular public school classrooms, with some sort of special tutoring or other programs; placement in special classes within regular neighborhood schools; placement in community schools specially designated for the retarded; and placement in residential schools and residential custodial facilities. Selection for any given child will be based jointly on the child's intellectual ability, and on the educational philosophy and economic base of the particular school district.

Schooling for the educable mentally retarded: are special classes desirable?

There has long been a question as to whether children of borderline intellectual ability should be assigned to a regular classroom or be given some sort of special training. When they are assigned to regular classes, the typical procedure is to offer "social promotions" to ensure that they keep up with their age peers. The reasoning behind such placement procedures is based on the premise that these children will develop greater social normalcy if they are not subject to intellectual discrimination in class assignment, and that they will be stimulated by and learn from intellectually normal peers with whom they associate. It is also argued that the stigma often associated with special education should be avoided.

The problem is captured eloquently in remarks by one child who was extremely distressed after testing relegated him to a special classroom for "slow learners":

> It really don't have to be the tests, but after the tests, there shouldn't be no separation for the classes. Because, as I say again, I felt good when I was with my class, but then they went and separated us—that changed us. That changed our ideas, our thinking, the way we thought about each other and turned us to enemies toward each other—because they said I was dumb and they were smart. [Hurley, 1969, p. 48]

If educable mentally retarded (EMR) children are integrated or "mainstreamed" into regular classes, though, we must be concerned about the possibility that they will be isolated or rejected. In a series of studies, Gottlieb and his associates have explored this problem. In the first study (Goodman, Gottlieb, and Harrison, 1972) EMR children integrated into a nongraded school were found to be rejected significantly more often than a comparable group of children segregated into a special class. Results of a second study (Gottlieb and Budoff, 1973) confirmed the initial findings and also showed that EMR children in an open, unwalled school were more likely to be known by their nonretarded peers than were EMR children attending a traditional school. Nonetheless, retarded children were not any more likely to be chosen as friends in this open environment than in the traditional one.

Pursuing the issue of friendship, a third study (Gottlieb and Davis, 1973) involved the selection by nonretarded children of partners for a beanbag toss game in which prizes could be won. EMR children were chosen significantly less often than nonretarded children, and this was true regardless of whether the retarded children were integrated or attended special classes within the school. As Gottlieb points out, the overall pattern of findings highlights the need for identifying and then modifying those social behaviors or deficits of the retarded that are seen by nonretarded peers as inappropriate or unacceptable. Without such an effort, integrating retarded children into regular schools is as likely to be tragic as benefical.

Special classes for the educable mentally retarded In part because of the issues just mentioned, most mildly retarded children today are educated in special classes. EMR children rarely can benefit from an educational program that stresses academic accomplishments or preparation for higher education. Appropriate education includes, instead, an emphasis on the development of social competence and an effort to transmit useful occupational skills (see Figure 13–2). Reading and arithmetic, now minimal tools for getting along in our society, are also taught. As Robinson and Robinson note, "Even such a simple act as going to the movies is much more feasible and pleasant if one can learn from the newspaper the time at which the feature begins, take along enough money for tickets and popcorn, and recognize the President of the United States when he appears on the newsreel" (1965, p. 471).

Whether special classes do in fact meet the special needs of the EMR child is hotly debated, but it does seem clear that they have been less successful than would be hoped (Dunn, 1968; Hammons, 1972). Bauer (1967), for example, studied numerous curricula that were employed in special classes and concluded that they were not programmed directly to the strengths and weaknesses of individual children, but rather were inferior copies of what was taught in normal classes. He also observed that one almost universal feature was an endless repetition, virtually guaranteed to bore children of any developmental level. Another problem with most programs designed for the retarded is that they are disconnected from the child's everyday life. Finley (1962) found that retar-

FIGURE 13–2
An important aspect of teaching the educable mentally retarded involves development of useful occupational skills. Courtesy Robert Sansone, Association for the Help of Retarded Children, Inc.

dates were better at manipulating arithmetic symbols than normals of the same mental age, but that the latter were far better in ability to solve concrete problems. Because most mentally deficient individuals need to solve practical arithmetic problems rather than theoretical ones, the classroom emphasis on manipulation of symbols appears unwise. Another study (Goldstein, Moss, and Jordan, 1965) compared the academic accomplishment of retarded children placed in regular and special classes over a four-year period and found that no substantial differences were present either in IQ test performance or in general knowledge.

Education of the trainable mentally retarded "Trainable mentally retarded" (TMR), it will be recalled, is a term usually applied to children with IQs between 25 and 49. It is important to note, though, that this is a rather wide range. At the upper end special classes, schools, or residential institutions have often succeeded in teaching these youngsters a variety of self-care skills; they may learn cooking, grooming, table-setting, and the ability to dress and feed themselves. Often, too, they are able to acquire a reasonable minimal vocabulary and sufficient skills to have some communication with others. Occupationally, they can often function in sheltered workshops, in which simple tasks are performed under the careful supervisory guidance of skillful educators and professionals.

At the lower end of this IQ range, however, the story is often discouraging. Youngsters with IQs below about 35 have often been—and frequently still are—regarded simply as custodial cases and there has been little attempt to educate them. Only quite recently have various instrumental learning procedures (e.g., reinforcement, shaping) been employed with TMR children with some success.

A particularly good example of this work is that of Bijou, Birnbrauer, Kidder, and Tague (1966), who taught arithmetic, reading, and writing skills to a group of severely retarded children, including some diagnosed as brain damaged or with Down's syndrome. Their program had three goals: (1) to institute an effective motivational system for each child; (2) to develop programmed instructional materials that would result in more cooperation and industry; and (3) to program materials that would teach specific useful skills such as telling time, handling money, and reading. The first goal was accomplished by providing tokens for correct answers, cooperation, and other desired behavior. The tokens could later be traded for money, trinkets, or candy and could also be saved for more substantial benefits, such as trips.

A wide variety of prerequisite behaviors, such as sitting quietly and paying attention, was necessary before these retarded children were able to study effectively. Incompatible behaviors such as yelling and fighting had to be eliminated. The research group emphasized the importance of self-directed studying in meeting these goals, reasoning that if students could study for long periods of time—while receiving attention, praise, and tokens for their efforts—they would be less likely to be disruptive. At first the retarded children were rewarded for relatively short periods of self-directed study; gradually they were required to work for longer periods before praise and tokens were dispensed.

Recognizing that their system would not always be effective, Bijou and his associates set off a small closetlike room as a "time-out" device. When children were persistently disruptive they were removed from the classroom and placed alone in the time-out room for ten minutes; they were not allowed to return until they had been quiet for thirty seconds after that. The success both of this procedure and of the positive incentives that were offered is shown by the fact that the time-out room was very rarely used.*

The writing program best reflects the investigators' general approach in using shaping procedures (described in detail in Chapter 6). At first the program capitalized on a pretraining skill—in this case, tracing letters. Later, students were presented parts of letters and were required to fill in the rest. In the final step in this stage they first had to

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*The term "time-out," among those working with children's behavior problems, is an abbreviation for *time out from positive reinforcement* and refers to the fact that no one can enjoy any of the benefits of usual social interaction while in isolation.

[illegible]

print each letter with only minimal cues, and then whole words. Next, children were requested to copy letters from a blackboard.

In summarizing their study, the investigators enthusiastically concluded: "The results of this study suggest that the academic future of the majority of retarded children is much brighter than had been foretold by the theorists who assume that abilities, capacities, and traits are largely fixed" ([illegible] et al., 1966, p. [illegible]).

Overworked nonprofessional employees are often the only people working with more severely retarded youngsters; it is understandable that they are frequently engaged in a situation in which children receive little more than custodial care. But attempts are being made to train nonprofessional employees as effective teachers of the severely retarded. Such an approach, for example, was the basis of a program designed to teach language to children with IQs of 35 and under (Phillips, Liebert, and Poulos, 1973). Women with high school educations were employed as aides and supplied with a "language training packet" which included (1) a simplified introduction to the use of modeling and reward in teaching techniques, (2) highly specific and detailed lesson plans, and (3) a variety of materials necessary for teaching simple language in an interesting way, such as special color slides of various kinds and types of clothing, and a flannelboard chart on which clothing items could be placed.

The aides worked with a trained psychologist for a week, after which they conducted classes of approximately seven children each for about two months. They first taught students to identify objects in their slide representations and then to verbalize the appropriate label. A typical class lesson is shown in Table 15-2.

TABLE 15-2
A SAMPLE LESSON FROM THE LANGUAGE UNIT BY [illegible] (1970)

[illegible]

[illegible]

[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]

Employing the usual experimental approach, before-and-after performances of these retarded youngsters were compared with those of other children from the same wards who had been matched on the basis of IQ, sex, age, race, and behavior problems but had not received any special training. The results were encouraging. Significant improvements in language skills were found for the trained group, with little or no corresponding changes for the untrained group. In fact, among the former, many youngsters who were previously mute or who had communicated only in grunts said their first words. At the same time these youngsters showed improvement in social behavior; behavior problems diminished or stopped, the children began actively participating in and enjoying their classes, and they began to interact more effectively with each other. It appears clear, then, that progress can be made with youngsters at this level of intellectual ability if sufficient care is taken to develop programs specially suited to their needs and potentialities.

THE INTELLECTUALLY GIFTED

Interest in the gifted child in the twentieth century has gone through three distinct periods (Barbe and Frierson, 1965). First there was an emphasis, spearheaded mainly by Lewis M. Terman, on identifying and describing the gifted. Then a period ensued that largely consisted of the laying of groundwork by interested groups for special education for the gifted. Finally, the launching of Sputnik gave impetus to the provision of programs that would serve their needs.

There is no doubt that Terman, who was responsible for developing the Stanford-Binet Intelligence Test, stands out as one of the leaders in this area. Selection 8 is a well-known address in which he describes his research and findings. Terman's portrayal of the gifted may not now come as a surprise, largely as a result of the great influence his work has exerted. At one time the attitude of Americans toward the gifted was one of suspicion; they were considered strange, different, odd, if not downright "mad." It is Terman's work that shifted this attitude in a much more favorable direction.

SELECTION 8

THE DISCOVERY AND ENCOURAGEMENT OF EXCEPTIONAL TALENT

Lewis M. Terman

I have often been asked how I happened to become interested in mental tests and gifted children. My first introduction to the scientific problems posed by intellectual differences occurred well over a half-century ago when I was a senior in psychology at Indiana University and was asked to prepare two reports for a seminar, one on mental deficiency and one on genius. Up to that time, despite the fact that I had graduated from a normal college as a Bachelor of Pedagogy and had taught school for five years, I had never so much as heard of a mental test. The reading for those two reports opened up a new world to me, the world of Galton, Binet, and their contemporaries. The following year my MA thesis on leadership among children (Terman, 1904) was based in part on tests used by Binet in his studies of suggestibility.

Then I entered Clark University, where I spent considerable time during the first year in reading on mental tests and precocious children. Child prodigies, I soon learned, were at that time in bad repute because of the prevailing belief that they were usually psychotic or otherwise abnormal and almost sure to burn themselves out quickly or to develop postadolescent stupidity. "Early ripe, early rot" was a slogan frequently encountered. By the time I reached my last graduate year, I decided to find out for myself how precocious children differ from the mentally backward, and accordingly chose as my doctoral dissertation an experimental study of the intellectual processes of fourteen boys, seven of them picked as the brightest and seven as the dullest in a large city school (Terman, 1906). These subjects I put through a great variety of intelligence tests, some of them borrowed from Binet and others, many of them new. The tests were given individually and required a total of 40 or 50 hours for each subject. The experiment contributed little or nothing to science, but it contributed a lot to my future thinking. Besides "selling" me completely on the value of mental tests as a research method, it offered an ideal escape from the kinds of laboratory work which I disliked and in which I was more than ordinarily inept. (Edward Thorndike confessed to me once that *his* lack of mechanical skill was partly responsible for turning *him* to mental tests and to the kinds of experiments on learning that required no apparatus.)

However, it was not until I got to Stanford in 1910 that I was able to pick up with mental tests where I had left off at Clark University. By that time Binet's 1905 and 1908 scales had been published, and the first thing I undertook at Stanford was a tentative revision of his 1908 scale. This, after further revisions, was published in 1916. The standardization of the scale was based on tests of a thousand children whose IQ's ranged from 60 to 145. The contrast in intellectual performance between the dullest and the brightest of a given age so intensified my earlier interest in the gifted that I decided to launch an ambitious study of such children at the earliest opportunity.

Adapted and reprinted from L. M. Terman, The discovery and encouragement of exceptional talent. *American Psychologist*, 1954, 9, 221–230. Copyright 1954 by the American Psychological Association. Reproduced by permission.

My dream was realized in the spring of 1921 when I obtained a generous grant from the Commonwealth Fund of New York City for the purpose of locating a thousand subjects of IQ 140 or higher. More than that number were selected by Stanford-Binet tests from the kindergarten through the eighth grade, and a group mental test given in 95 high schools provided nearly 400 additional subjects. The latter, plus those I had located before 1921, brought the number close to 1,500. The average IQ was approximately 150, and 80 were 170 or higher (Terman, 1925).

The twofold purpose of the project was, first of all, to find what traits characterize children of high IQ, and secondly, to follow them for as many years as possible to see what kind of adults they might become. This meant that it was necessary to select a group representative of high-testing children in general. With the help of four field assistants, we canvassed a school population of nearly a quarter-million in the urban and semi-urban areas of California. Two careful checks on the methods used showed that not more than 10 or 12 per cent of the children who could have qualified for the group in the schools canvassed were missed. A sample of close to 90 per cent insured that whatever traits were typical of these children would be typical of high-testing children in any comparable school population.

Time does not permit me to describe the physical measurements, medical examinations, achievement tests, character and interest tests, or the trait ratings and other supplementary information obtained from parents and teachers. Nor can I here describe the comparative data we obtained for control groups of unselected children. The more important results, however, can be stated briefly: children of IQ 140 or higher are, in general, appreciably superior to unselected children in physique, health, and social adjustment; markedly superior in moral attitudes as measured either by character tests or by trait ratings; and vastly superior in their mastery of school subjects as shown by a three-hour battery of achievement tests. In fact, the typical child of the group had mastered the school subjects to a point about two grades beyond the one in which he was enrolled, some of them three or four grades beyond. Moreover, his ability as evidenced by achievement in the different school subjects is so general as to refute completely the traditional belief that gifted children are usually one-sided. I take some pride in the fact that not one of the major conclusions we drew in the early 1920's regarding the traits that are typical of gifted children has been overthrown in the three decades since then.

Results of thirty years' follow-up of these subjects by field studies in 1927–28, 1939–40, and 1951–52, and by mail follow-up at other dates, show that the incidence of mortality, ill health, insanity, and alcoholism is in each case below that for the generality of corresponding age, that the great majority are still well adjusted socially, and that the delinquency rate is but a fraction of what it is in the general population. Two forms of our difficult Concept Mastery Test, devised especially to reach into the stratosphere of adult intelligence, have been administered to all members of the group who could be visited by the field assistants, including some 950 tested in 1939–40 and more than 1,000 in 1951–52. On both tests they scored on the average about as far above the generality of adults as they had scored above the generality of children when we selected them. Moreover, as Dr. Bayley and Mrs. Oden have shown, in the twelve-year interval between the two tests, 90 per cent increased their intellectual stature as measured by this test. "Early ripe, early rot" simply does not hold for these subjects. So far, no one has developed postadolescent stupidity!

As for schooling, close to 90 per cent entered college and 70 per cent graduated. Of those graduating, 30 per cent were awarded honors and about two-thirds remained for graduate work. The educational record would have been still better but for the fact that a majority reached college age during the great depression. In their undergraduate years 40 per cent of the men and 20 per cent of the women earned half or more of their college expenses, and the total of undergraduate and graduate expenses earned amounted to $670,000, not counting stipends from scholarships and fellowships, which amounted to $350,000.

The cooperation of the subjects is indicated by the fact that we have been able to keep track of more than 90 per cent of the original group, thanks to the rapport fostered by the incomparable field and office assistants I have had from the beginning of the study to the present. I dislike to think how differently things could have gone with helpers even a little less competent.

The achievement of the group to midlife is best illustrated by the case histories of the 800 men, since only a minority of the women have gone out for professional careers (Terman, 1954b). By 1950, when the men had an average age of 40 years, they had published 67 books (including 46 in the fields of science, arts, and the humanities, and 21 books of fiction). They had published more than 1,400 scientific, technical, and professional articles; over 200 short stories, novelettes, and plays; and 236 miscellaneous articles on a great variety of subjects. They had also authored more than 150 patents. The figures on publications do not include the hundreds of publications by journalists that classify as news stories, editorials, or newspaper columns; nor do they include the hundreds if not thousands of radio and TV scripts.

The 800 men include 78 who have taken a Ph.D. degree or its equivalent, 48 with a medical degree, 85 with a law degree, 74 who are teaching or have taught in a four-year college or university, 51 who have done basic research in the physical sciences or engineering, and 104 who are engineers but have done only applied research or none. Of the scientists, 47 are listed in the 1949 edition of *American Men of Science.* Nearly all of these numbers are from 10 to 20 or 30 times as large as would be found for 800 men of corresponding age picked at random in the general population, and are sufficient answer to those who belittle the significance of IQ differences.

The follow-up of these gifted subjects has proven beyond question that tests of "general intelligence," given as early as six, eight, or ten years, tell a great deal about the ability to achieve either presently or 30 years hence. Such tests do not, however, enable us to predict what direction the achievement will take, and least of all do they tell us what personality factors or what accidents of fortune will affect the fruition of exceptional ability. Granting that both interest patterns and special aptitudes play important roles in the making of a gifted scientist, mathematician, mechanic, artist, poet, or musical composer, I am convinced that to achieve greatly in almost any field, the special talents have to be backed up by a lot of Spearman's *g*, by which is meant the kind of general intelligence that requires ability to form many sharply defined concepts, to manipulate them, and to perceive subtle relationships between them; in other words, the ability to engage in abstract thinking.

The study of Catharine Cox of the childhood traits of historical geniuses gives additional evidence regarding the role of general intelligence in exceptional achievement. That study was part of our original plan to investigate superior ability by two methods of approach: (*a*) by identifying and following living gifted subjects from childhood onward; and (*b*) by proceeding in the opposite direction and tracing the mature genius back to his childhood promise. With a second grant from the Commonwealth Fund, the latter approach got under way only a year later than the former and resulted in the magnum opus by Cox entitled *The Early Mental Traits of Three Hundred Geniuses* (1926). Her subjects represented an unbiased selection from the top 510 in Cattell's objectively compiled list of the 1,000 most eminent men of history. Cox and two able assistants then scanned some 3,000 biographies in search of information that would throw light on the early mental development of these subjects. The information thus obtained filled more than 6,000 typed pages. Next, three psychologists familiar with mental age norms read the documentary evidence on all the subjects and estimated for each the IQ that presumably would be necessary to account for the intellectual behavior recorded for given chronological ages. Average of three IQ estimates was used as the index of intelligence. In fact two IQ's were estimated for each subject, one based on the evidence to age 17, and the other on evidence to the mid-twenties. The recorded evidence on development to age 17 varied from very little to an amount that yielded about as valid an IQ as a good intelligence test would give. Examples of the latter are Goethe, John Stuart Mill, and Francis Galton. It was the documentary information on Galton, which I summarized and published in 1917 (Terman, 1917), that decided me to prepare plans for the kind of study that was carried out by Cox. The average of estimated IQ's for her 300 geniuses was 155, with many going as high as 175 and several as high as 200. Estimates below 120 occurred only when there was little biographical evidence about the early years.

It is easy to scoff at these postmortem IQ's, but as one of the three psychologists who examined the evidence and made the IQ ratings, I think the author's main conclusion is fully warranted; namely, that "the genius who achieves highest eminence is one whom intelligence tests would have identified as gifted in childhood."

Special attention was given the geniuses who had sometime or other been labeled as backward in childhood, and in every one of these cases the facts clearly contradicted the legend. One of them was Oliver Goldsmith, of whom his childhood teacher is said to have said "Never was so dull a boy." The fact is that little Oliver was writing clever verse at 7 years and at 8 was reading Ovid and Horace. Another was Sir Walter Scott, who at 7 not only read widely in poetry but was using correctly in his written prose such words as "melancholy" and "exotic." Other alleged childhood dullards included a number who disliked the usual diet of Latin and Greek but had a natural talent for science. Among these were the celebrated German chemist Justus von Liebig, the great English anatomist John Hunter, and the naturalist Alexander von Humboldt, whose name is scattered so widely over the maps of the world.

In the cases just cited one notes a tendency for the direction of later achievement to be foreshadowed by the interests and preoccupations of childhood. I have tried to determine how frequently this was true of the 100 subjects in Cox's group whose childhood was best documented. Very marked foreshadowing was noted in the case of more than half of the group, none at all in less than a fourth. Macaulay, for example, began his career as historian at the age of 5 with what he called a "Compendium of Universal History," filling a quire of paper before he lost interest in the project. Ben Franklin before the age of 17 had displayed nearly all the traits that characterized him in middle life: scientific curiosity, religious heterodoxy, wit and buffoonery, political and business shrewdness, and ability to write. At 11 Pascal was so interested in mathematics that his father thought it best to deprive him of books on this subject until he had first mastered Latin and Greek. Pascal secretly proceeded to construct a geometry of his own and covered the ground as far as the 32nd proposition of Euclid. His father then relented. . . .

The Ford Fund for the Advancement of Education has awarded annually since 1951 some 400 college scholarships to gifted students who are not over 16½ years old, are a year or even two years short of high school graduation, but show good evidence of ability to do college work. Three quarters of them are between 15½ and 16½ at the time of college entrance. A dozen colleges and universities accept these students and are keeping close track of their success. A summary of their records for the first year shows that they not only get higher grades than their classmates, who average about two years older, but that they are also equally well adjusted socially and participate in as many extracurricular activities (Fund for the Advancement of Education, 1953). The main problem the boys have is in finding girls to date who are not too old for them! Some of them have started a campaign to remedy the situation by urging that more of these scholarships be awarded to girls.

The facts I have given do not mean that all gifted children should be rushed through school just as rapidly as possible. If that were done, a majority with IQ of 140 could graduate from high school before the age of 15. I do believe, however, that such children should be promoted rapidly enough to permit college entrance by the age of 17 at latest, and that a majority would be better off to enter at 16. The exceptionally bright student who is kept with his age group finds little to challenge his intelligence and all too often develops habits of laziness that later wreck his college career. . . .

But however efficient our tests may be in discovering exceptional talents, and whatever the schools may do to foster those discovered, it is the prevailing *Zeitgeist* that will decide, by the rewards it gives or withholds, what talents will come to flower. In Western Europe of the Middle Ages, the favored talents were those that served the Church by providing its priests, the architects of its cathedrals, and the painters of religious themes. A few centuries later the same countries had a renaissance that included science and literature as well as the arts. Although presumably there are as many potential composers of great music as there ever were, and as many potentially great artists as in the days of Leonardo da Vinci and Michaelangelo, I am reliably informed that in this country today it is almost impossible for a composer of *serious* music to earn his living except by teaching, and that the situation is much the same, though somewhat less critical, with respect to artists. . . .

In this address I have twice alluded to the fact that achievement in school is influenced by many things other than the sum total of intellectual abilities. The same is true of success in life. In closing I will tell you briefly about an attempt we made a dozen years ago to identify some of the nonintellectual factors that have influenced life success among the men in my gifted group. Three judges, working independently, examined the records (to 1940) of the 730 men who were then 25 years old or older, and rated each on life success. The criterion of "success" was the extent to which a subject had made use of his superior intellectual ability, little weight being given to earned income. The 150 men rated highest for success and the 150 rated lowest were then compared on some 200 items of information obtained from childhood onward (Terman and Oden, 1947). How did the two groups differ?

During the elementary school years, the A's and C's (as we call them) were almost equally successful. The average grades were about the same, and average scores on achievement tests were only a trifle higher for the A's. Early in high school the group began to draw apart in scholarship, and by the end of high school the slump of the C's was quite marked. The slump could not be blamed on extracurricular activities, for these were almost twice as common among the A's. Nor was much of it due to difference in intelligence. Although the A's tested on the average a little higher than the C's both in 1922 and 1940, the average score made by the C's in 1940 was high enough to permit brilliant college work, in fact was equaled by only 15 per cent of our highly selected Stanford students. Of those who graduated, 52 per cent of the A's but only 14 per cent of the C's graduated with honors. The A's were also more accelerated in school; on the average they were six months younger on completing the eighth grade, 10 months younger at high school graduation, and 15 months younger at graduation from college.

The differences between the educational histories of the A's and C's reflect to some degree the differences in their family backgrounds. Half of the A fathers but only 15 per cent of the C fathers were college graduates, and twice as many of A siblings as of C siblings graduated. The estimated number of books in the A homes was nearly 50 per cent greater than in the C homes. As of 1928, when the average age of the subjects was about 16 years, more than twice as many of the C parents as of A parents had been divorced.

Interesting differences between the groups were found in the childhood data on emotional stability, social adjustments, and various traits of personality. Of the 25 traits on which each child was rated by parent and teacher in 1922 (18 years before the A and C groups were made up), the only trait on which the C's averaged as high as the A's was general health. The superiority of the A's was especially marked in four volitional traits: prudence, self-confidence, perseverance, and desire to excel. The A's also rated significantly higher in 1922 on leadership, popularity, and sensitiveness to approval or disapproval. By 1940 the difference between the groups in social adjustment and all-round mental stability had greatly increased and showed itself in many ways. By that time four-fifths of the A's had married, but only two-thirds of the C's, and the divorce rate for those who had married was twice as high for the C's as for the A's. Moreover, the A's made better marriages; their wives on the average came from better homes, were better educated, and scored higher on intelligence tests.

But the most spectacular differences between the two groups came from three sets of ratings, made in 1940, on a dozen personality traits. Each man rated himself on all the traits, was rated on them by his wife if he had a wife, and by a parent if a parent was still living. Although the three sets of ratings were made independently, they agreed unanimously on the four traits in which the A and C groups differed most widely. These were "persistence in the accomplishment of ends," "integration toward goals, as contrasted with drifting," "self-confidence," and "freedom from inferiority feelings." . . . These closely parallel the traits that Cox found to be especially characteristic of the 100 leading geniuses in her group whom she rated on many aspects of personality; their three outstanding traits she defined as "persistence of motive and effort," "confidence in their abilities," and "strength or force of character."

There was one trait on which only the parents of our A and C men were asked to rate them; that trait was designated "common sense." As judged by parents, the A's are again reliably superior. . . .

Everything considered, there is nothing in which our A and C groups present a greater contrast than in drive to achieve and in all-round mental and social adjustment. Our data do not support the theory of Lange-Eichbaum (1932) that great achievement usually stems from emotional tensions that border on the abnormal. In our gifted group, success is associated with stability rather than instability, with absence rather than with presence of disturbing conflicts—in short with well-balanced temperament and with freedom from excessive frustrations. The Lange-Eichbaum theory may explain a Hitler, but hardly a Churchill; the junior senator from Wisconsin,* possibly, but not a Jefferson or a Washington.

At any rate, we have seen that intellect and achievement are far from perfectly correlated. To identify the internal and external factors that help or hinder the fruition of exceptional talent, and to measure the extent of their influences, are surely among the major problems of our time. These problems are not new; their existence has been recognized by countless men from Plato to Francis Galton. What is new is the general awareness of them caused by the manpower shortage of scientists, engineers, moral leaders, statesmen, scholars, and teachers that the country must have if it is to survive in a threatened world. These problems are now being investigated on a scale never before approached, and by a new generation of workers in several related fields. Within a couple of decades vastly more should be known than we know today about our resources of potential genius, the environmental circumstances that favor its expression, the emotional compulsions that give it dynamic quality, and the personality distortions that can make it dangerous.

---

*The reference is to Joseph McCarthy. —Ed.

EDUCATION OF THE GIFTED

One of the issues raised by Terman that is still relevant today concerns school acceleration as a method of educating the gifted. In essence, acceleration involves some kind of early admission that moves the child through formal education more rapidly than average. The youngster may be allowed to start kindergarten earlier or skip grades. Critics of such an approach have consistently voiced the fear that acceleration is detrimental because a child is forced to interact with physically and socially more mature peers. As Terman noted, however, the facts do not support this view, although obviously it is possible that acceleration can be harmful in some individual cases. Nevertheless, many educators argue that curriculum enrichment and special placement are better alternatives.

FIGURE 13–4
The bright child is also intellectually exceptional. These sixth-graders are trying their hand at a computer. Sam Falk, Monkmeyer.

Enrichment Enrichment procedures ensure that gifted students will be maintained at average age-grade level while being exposed to experiences beyond the usual. They may be given special work or opportunity for additional studies and will generally be encouraged to work with initiative and independence. Enrichment has been a popular notion with educators because it requires little organizational change within a school system—and it is inexpensive. By way of example, one well-thought-out enrichment program for gifted elementary school pupils has been in operation for the past few years in the San Francisco Unified School District (Ryder, 1972). The program involves training exceptionally bright fifth-graders to serve as junior docents in museums in the San Francisco area. Developed in collaboration with the California Academy of Sciences, the experience has been described as follows:

> The term "docent" refers to a teacher. As museums use the word today it indicates a group of volunteers who are trained by the museums' staff of experts to guide visitors through art or natural science exhibits. This junior docent program brings together small groups of gifted students and those potentially gifted in the sciences in a setting ideal for teaching science to other pupils who visit the museum exhibits. The docents are selected from many different schools and brought together in small study groups that will provide a cross-cultural experience and an opportunity to be academically challenged, to act in leadership roles, and to widen their horizons. [Ryder, 1972, p. 629]

Although reports of the San Francisco program suggest that it has been highly successful, others have found that enrichment programs have their drawbacks. The effort, talent, and time required for teachers to plan a systematic program for individual children is considerable. Furthermore, teachers are sometimes left to their own resources to identify gifted students, a procedure that is less than adequate. For example, in one study it was found that 70 percent of the youngsters selected as bright by kindergarten teachers had a mean IQ of only 102.5, while 68 percent of those with IQs of 116 or above were not identified (Kirk, 1972). Similar errors occur for students in higher grades, perhaps because extremely high intelligence is often manifested in ways that teachers consider behavior problems. Many years ago Leta Hollingworth, a pioneer in the study of the gifted, recorded this example:

> The foolish teacher who hates to be corrected by a child is unsuited to these children. [I can] illustrate the difficulty from recent conversation with a ten-year-old boy of I.Q. 165. This boy was referred to us as a school problem: "Not interested in school work. Very impudent. A liar." The following is a fragment of conversation with this boy:
>
> What seems to be your main problem in school?
> Several of them.
> Name one.

Well, I will name the teachers. Oh, boy! It is bad enough when the pupils make mistakes, but when the teachers make mistakes, oh, boy!

Mention a few mistakes the teachers made.

For instance, I was sitting in 5A and the teacher was teaching 5B. She was telling those children that the Germans discovered printing, that Gutenberg was the first discoverer of it, mind you. After a few minutes I couldn't stand it. I am not supposed to recite in that class, you see, but I got up. I said, "No; the Chinese invented, not discovered printing, before the time of Gutenberg—while the Germans were still barbarians."

Then the teacher said, "Sit down. You are entirely too fresh." Later on, she gave me a raking over before the whole class. Oh, boy! What teaching!

It seemed to me that one should begin at once in this case about suffering fools gladly. So I said, "Ned, that teacher is foolish, but one of the very first things to learn in the world is to suffer fools gladly." The child was so filled with resentment that he heard only the word "suffer."

"Yes, that's it. That's what I say! Make 'em suffer. Roll a rock on 'em."

Before we finished the conversation, Ned was straightened out on the subject on who was to do the suffering. He agreed to do it himself. [1942, pp. 424–425]

Special grouping The most blatantly different education for the gifted involves specially designed classes or programs. Children may be kept in their neighborhood schools where they attend classes only with other gifted students, or they may actually attend different schools. The curriculum is advanced and/or emphasizes the development of initiative and intellective skills.

The San Diego Independent Study-Seminar Program for highly gifted high school students typifies the special grouping approach. Here each student plans her or his own unique program of education, in consultation with a faculty adviser. Participants may become involved in courses, seminars, or independent study; decisions are based on interest rather than on formal requirements and may involve such diverse patterns as studying at a neighborhood university or exclusively pursuing guided readings in an area of personal interest. Inasmuch as the IQ range of those enrolled ranges from a *low* of 148 to a high of well over 180, few of these pursuits turn out to be trivial. One tenth-grader in the program, for example, chose to explore the topic of socio-economic conflict between the individual and society. Puzzled by the motivation that leads to war and strife, he asked: "Is that motivation traceable to a basic animalistic instinct, or is man primarily influenced and motivated by other men and society?" (Martinson, Hermanson, and Banks, 1972). By the end of the year, this young man had written a thoughtful essay on the topic.

A concern frequently raised about such radical programs is that they will imbue the gifted with an exaggerated sense of their own superiority and thus foster elitism. The San Diego experience suggests, however, that quite the reverse may be true. It is when gifted students find themselves in average classrooms, surrounded by people much less talented than they are, that false pompousness develops. For the gifted, being surrounded by intellectural peers is often sobering. Said one:

> Before the independent study-seminar program, I saw myself as a sort of minor deity. I knew that I was more capable of thinking than most people; I didn't have contact with other people like myself. Now I know other people who can also think, and now I'm forced to accept the fact that I'm just a person, which is a great advantage. [Martinson, Hermanson, and Banks, 1972, p. 425]

Still, resistance to special programs for the gifted remains strong in many quarters.

Resistance to special programs: equality of education It is apparent that some sort of special education is desirable for the gifted. Commitment to such programs, however, may depend on societal attitudes toward them, and, in general, the commitment to special education for the gifted has not been strong. Among twenty-seven school districts chosen from a national sample because of their model programs for exceptional children, a total of only five programs for the gifted are reported (Martinson, 1971). Although Americans have a philosophical bent toward facilitating the growth of each individual, the strong belief in equal opportunities sometimes leads to providing the same treatments to people who differ in needs. Then, too, the gifted often do not appear, superficially at least, to require special help, and concern has been precluded by fear that those already privileged would be given even more privilege. DeHaan and Havighurst note these attitudes succinctly:

> [We] find various aspects of the "equality" theory working against special programs for the gifted. The stubborn equalitarianism in American public opinion says: "Treat everybody alike. Give every child a good chance, and every child an equal chance. That is the responsibility of the public schools. It is up to the child and his parents to make much or little out of what is offered to him." These sentiments sound good to American ears.
>
> Taxpayers who have children are likely to feel that their children should get everything other people's children get. Therefore they tend to look askance at a program that spends more money on a few "gifted" children than is spent on their own "average" children.
>
> Also people tend to accept the idea of spending public money on the handicapped but not on the gifted. The handicapped "deserve a break," as it were. . . . So runs the reasoning of the average taxpayer. But the gifted child has an initial advantage. Why should he be given more help in school than the average child when he can learn so much more easily? [1957, p. 23]

Effectiveness of special programs Overall, there has been little precise evaluation of special education for the gifted. The evidence regarding the effects of special classes is not clear, although it tends to show positive results (McCandless, 1967). In California, for example, academic achievement of 929 gifted elementary and secondary students was compared on the basis of whether or not they participated in special procedures (Martinson, 1961), and it was found that acceleration, enrichment, and special classes all resulted in better performance.

Defining giftedness: a continuing issue It is obvious that before any child can be placed in a special program, he or she must be identified as potentially able to profit from such placement. As various new programs for the gifted emerge, the problem of identifying students with exceptional talent is becoming more important—and controversial. Feldman and Bratton (1972) provide a striking example of the dilemma.

These investigators administered a battery of eighteen measures, each of which had previously been used as a criterion for identifying the gifted, to all pupils enrolled in fifth-grade classes in suburban Minneapolis. Such measures as IQ tests, teacher nominations, grades, and the *Primary Mental Abilities* test were used. The investigators then asked what would happen if these measures were now used to select participants for a hypothetical program for gifted students. Reasonably enough, they suggested that the top five students on each measure be chosen. (On the direct IQ measure, the top five all had scores of 130 or above.) The question of major interest was this: To what degree would access to the special program depend on which criterion measure was used?

The results were striking. First, across both classes only four students were above the cutoff on more than half of the criteria, and *no* student was in the top five on all measures. On the other hand, fully 92 percent of all students were in the top five on at least one measure. It is therefore apparent that almost no one (or almost everyone) would be a candidate for such a program, depending merely on which criteria were used for selection—and this even though each of the measures had actually been used before in making such decisions. The major point? Before making further progress in developing programs for the gifted, educators and psychologists will have to decide which criteria to emphasize, which criteria to eliminate, and in what combination multiple criteria should be used. So far, these questions have not been answered.

For example, in a survey of schools in the United States, 57.5 percent reported that they had *no* gifted students, despite the fact that most researchers in the field agree that on the average, two to three of every one hundred children actually are gifted. Although this may mirror indifference or hostility toward recognizing the needs of the exceptionally able (Martinson, 1971), it also may reflect confusion as to how to define giftedness.

Performance on intelligence tests most often determines who will or will not be labeled gifted. Perhaps the most commonly used cutoff is an IQ of 130. There is, however, a growing tendency to widen this criterion to include special talents and, more often, creativity. In one survey, a congressional inquiry into the educational needs of the gifted, experts favored multiple means for identification, including intelligence tests and measures of achievement, talent, and creativity (Marland, 1971). It is to the exceptionally creative individual that we now turn.

CREATIVITY

We have seen that IQ scores are relatively good predictors of a variety of behaviors labeled intelligent or adaptive. One may wonder, though, whether there isn't something else, beyond intellectual skills as usually measured, which contributes to the production of great ideas and significant accomplishments—in other words, to creativity.

RELATIONSHIP BETWEEN SCHOOL PERFORMANCE AND LIFE ACCOMPLISHMENTS

One strategy for trying to understand creativity consists of comparing "average" people with very successful people in various occupations, such as art, scientific research, mathematics, and writing. Are those who have made the most significant adult contributions the ones with higher intelligence? Did they have the better grades in school?

To answer these questions, researchers at the Institute for Personality Assessment and Research, University of California at Berkeley, have compared creative and less creative people. In one study (Helson and Crutchfield, 1970) involving mathematicians, the index of creativity was nominations by other mathematicians for significant accomplishment in mathematics research. The highly creative scholars were compared with others, matched for age (they were all in their late thirties), who had doctorates from universities of equally high standing. The men in the two groups were approximately equivalent in terms of the amount of time they spent on their work, yet, by agreement of their peers, they differed markedly in terms of the quality of their products. It came as a surprise, then, that the two groups were entirely comparable in terms of IQ as usually measured; at this range of ability, intelligence was unrelated to creativity.

In fact, those who are creatively accomplished as adults are often unidentifiable by school grades. "As students," writes researcher D. W. MacKinnon of one sample of creative individuals, "they were, in general, not distinguished for the grades they received, and in none of the samples did their high school grade-point average show any significant correlation with their subsequently achieved and recognized creativeness" (1968, p. 103).

Similar findings emerge from many other reports. Scientists' later professional standing is not related to their undergraduate grades, even in science itself (Harmon, 1963). Nor are grades as a graduate student relevant. Mednick (1963), for example, asked psychology professors to rate their graduate students in terms of creativity—the level of imaginativeness and potential of their research efforts—and found that this index of creativity was unrelated to intelligence. More striking, creativity was not even related to the grades the subjects were receiving—from the same professors—for their graduate course work in psychology. Thus, *at least within a certain range*, creative accomplishment seems to involve something other than, or in addition to, high intelligence. It is important to note, though, that creativity and IQ are unrelated only among individuals with a relatively high level of intellectual ability. We do not usually find exceptionally creative individuals below the average IQ range.

DEFINING AND MEASURING CREATIVITY

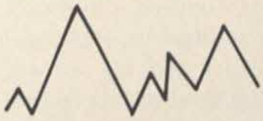
It seems, then, that we may fruitfully speak of creativity as distinct from intelligence, and perhaps measure and foster it relatively early in life. To do so, we must face again the hard problems of definition and measurement. Psychologists have devised many ways by which they attempt to measure creativity; usually pictures, words, or stories are presented to the individual, who is then asked to generate a product of some kind which is then judged for creativity (see Figure 13–5).

One way to define creativity, proposed by Jackson and Messick (1968), involves judging a person's products in terms of four criteria: novelty, appropriateness, transcendence of constraints, and coalescence of meaning. It is perhaps obvious that a creative product must be *novel* in the sense of being unusual, but more is also required. If we asked a nine-year-old boy: "How much is 2 + 2?" and he replied "17," we would be obliged to call the response unusual, but hardly creative. Thus, we add the criterion of *appropriateness*. In practice, though, appropriateness is not always easy to agree on. An artist dismissed as merely unusual and vulgar by one generation may be hailed for true creativity by the next.

The third criterion, *transcendence of constraints*, refers to combining elements in a way that at once defies tradition and yields a new perspective. The production of innovative scientific theories illustrates this quality. James Watson, one of the Nobel laureates who uncovered the structure of the DNA molecule, wrote of his own insight:

> It came while I was drawing. . . . Suddenly I realized the potentially profound implications of a DNA structure in which the adenine residue formed hydrogen bonds similar to those found in crystals of pure adenine. . . . As the clock went past midnight I was becoming more and more pleased. There had been far too many days when Francis [Crick, Watson's colleague] and I worried that the DNA structure might turn out to be superficially very dull, suggesting nothing about either its replication or its function in controlling cell biochemistry. But now, to my delight and amazement, the answer was turning out to be profoundly interesting. For over two hours I happily lay awake with pairs of adenine residues whirling in front of my closed eyes. Only for brief moments did the fear shoot through me that an idea this good could be wrong. [1968, pp. 116–118]

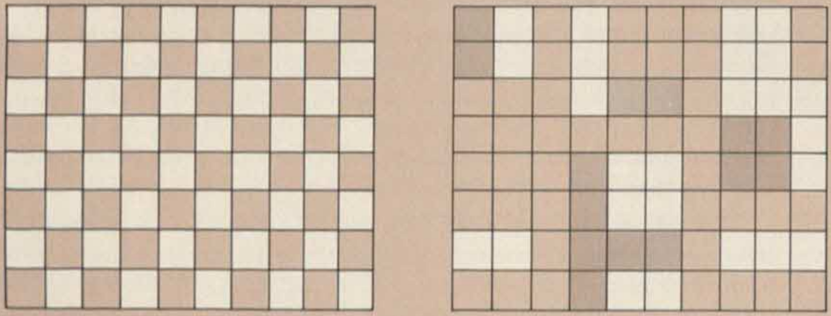
Children are asked what these lines mean to them. Adapted from M. A. Wallach and N. Kogan, Modes of Thinking in Young Children, *page 36, figure 3. New York: Holt, Rinehart & Winston, 1965. By permission of author and publisher.*



A Usual Answer:
Mountains

An Unusual Answer:
Squashed piece of paper.

Children are given colored materials and asked to make mosaics (similar to Hall, 1958).



Children are asked to tell a story about a picture of a man working late or early in an office. Adapted from Getzels and Jackson, 1962.

There's ambitious Bob, down at the office at 6:30 in the morning. Every morning it's the same. He's trying to show his boss how energetic he is. Now, thinks Bob, maybe the boss will give me a raise for all my extra work. The trouble is that Bob has been doing this for the last three years, and the boss still hasn't given him a raise. He'll come in at 9:00, not even noticing that Bob has been there so long, and poor Bob won't get his raise.

Judged Less Creative

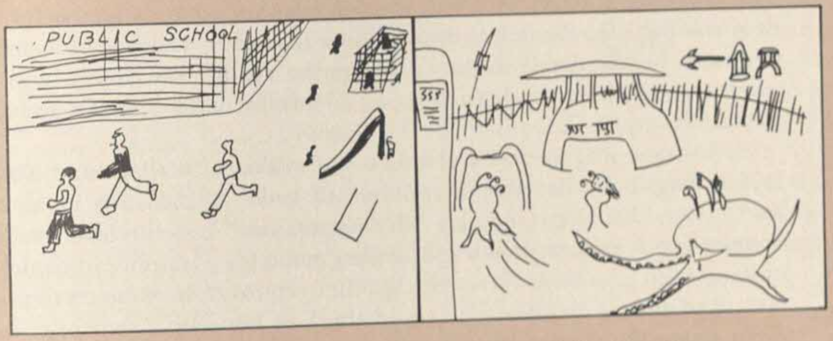
This man has just broken into this office of a new cereal company. He is a private eye employed by a competitor firm to find out the formula that makes the cereal bend, sag, and sway. After a thorough search of the office he comes upon what he thinks is the current formula. He is now copying it. It turns out that it is the wrong formula and the competitor's factory blows up. Poetic justice!

Judged Creative

FIGURE 13–5
Examples of the tasks given to individuals to test creativity, and judgments of the projects.

The final criterion suggested by Jackson and Messick, *coalescence of meaning*, is also reflected in Watson's account. The term suggests that creative products do not divulge themselves fully at first glance. The implications of a scientific innovation and the subtleties of great art both require, and reward, careful and repeated inspection.

Children are asked to draw a picture around the theme "playing tag in the school yard." Adapted from J. W. Getzels and P. W. Jackson, Creativity and Intelligence. *Copyright 1962, reproduced by permission of John Wiley & Sons, Inc.*



Judged Less Creative

Judged Creative

FIGURE 13-5 *(Continued)*

Jackson and Messick's model helps us to understand further what we are trying to "get at" as creativity, but we still need a definition sufficiently precise to suggest measurement techniques. The search was begun in the work of J. P. Guilford and his associates. Their distinction between convergent and divergent cognitive operations has direct implications for measuring and understanding creativity. Guilford himself has described it this way:

> In view of the active nature of creative performances, the production aspects or steps are most conspicuous and probably most crucial. . . . With some productive-thinking factors, and the tests that measure them, thinking must at some time converge toward one right answer. . . . With other productive-thinking factors and their tests, thinking need not come out with a unique answer; in fact, going off in different directions contributes to a better score in such tests. This type of thinking and these factors come under the heading of "divergent" thinking. It is in divergent thinking that we find the most obvious indications of creativity. [1957, pp. 111–112]

The Guilford group has researched quite extensively various dimensions of divergent thinking, in children, adolescents, and adults, in search of measures that can be discriminated from convergent thinking and from general intelligence as usually reflected in IQ. The principal research technique, factor analysis, is sufficiently complex that a variety of technical disputes exist regarding some interpretations of the work (see earlier mention of this method, p. 205). Yet Wallach

(1970) is on firm ground in stating that the significant outcome has been to identify *ideational fluency*—a person's ability to generate a plentiful number of ideas that are appropriate to a task—as a measurable characteristic that is cohesive but readily distinguishable from measures of convergent thinking.

WALLACH'S STUDIES

The work of Michael Wallach and his associates stands at the fore in determining (1) whether children differ from one another in a consistent way in ideational fluency that can be readily measured, and (2) whether such measures can be used to predict later creative accomplishments.

After reviewing a variety of sources of evidence, Wallach and Kogan (1965) began by devising a number of tasks to measure ideational fluency in children. One, an "alternative uses" test, involved asking youngsters to name as many uses as they could for a number of common objects, such as a shoe or a cork. Another required the subjects to point out all of the similarities they could think of between a pair of objects —for example, a train and a tractor or a potato and a carrot. A third involved naming as many concrete instances as possible of an abstract category such as round things or things that make noise. Finally, in addition to these three verbal measures, children were asked to generate ideas when presented with visual arrays; for example, they were asked to identify all the meanings they could think of for abstract patterns or abstract line drawings.

Participants in the first study were 151 fifth-grade children, both boys and girls. The investigators note that at least two types of measures could be derived from their results, the actual number of responses produced by a child and the number that are original. Interestingly, the two measures are very highly correlated. In other words, the rank ordering of the children is very similar regardless of whether performance is assessed by the total number of ideas produced or simply the number that are unique.

The Wallach-Kogan findings show clearly that the various procedures are internally reliable or consistent:

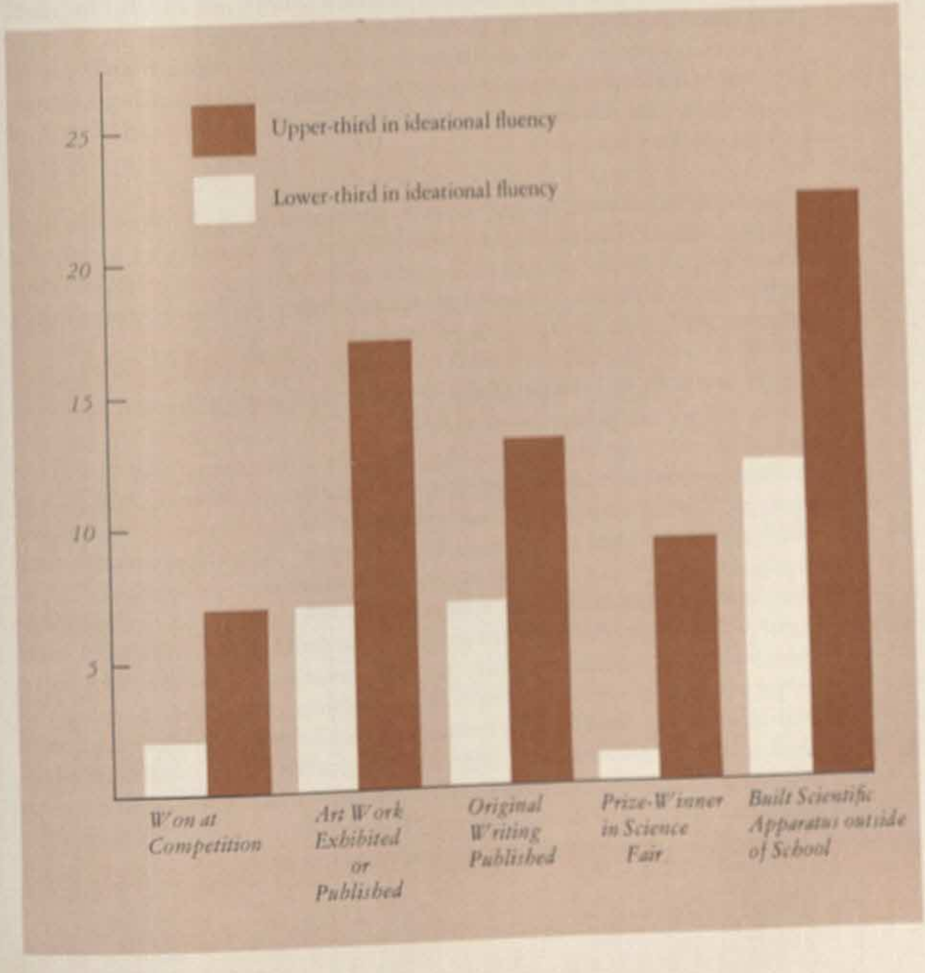
> Children who tended to generate larger numbers of ideas—or larger numbers of original ideas—in response to one of these procedures tended also to do this for the rest of the tasks. It did not matter, for example, whether the request for ideas were framed in visual or verbal terms. On the other hand, children who generated smaller numbers of ideas—or smaller numbers of unique ideas—for one of the tasks were comparably low in their standing for each of the remaining tasks. [Wallach, 1971, p. 8]

The next question was to determine whether these individual differences among children reflected anything more than difference in intelligence. To do so, WISC IQ scores for each child were obtained. It was found that IQ was *not* related to the creativity measure. Whether a child produced a large number of ideas simply was not predictable from the traditional measure of intelligence. This important pattern of results has since been replicated many times with younger boys (Ward, 1968), with additional samples of elementary school children (Pankove and Kogan, 1968), and with college freshmen (Wallach and Wing, 1969).

An adequate measure and definition of creativity is just the beginning of the exploration. We next want to know whether creativity measures are related to, or will predict, real-life accomplishments. The answer, on the basis of a growing body of evidence, appears to be yes.

Dewing (1970) obtained IQ scores and several measures of creativity, including ideational fluency for almost four hundred seventh-grade boys and girls. With IQ held constant, it was clear that the creativity measures were related significantly to meaningful accomplishments such as writing highly original compositions or being judged by teachers

FIGURE 13-6
Differences in productivity of college students high and low in ideational influency (a measure of creativity) in Wallach and Wing's research. Adapted from M. A. Wallach and C. W. Wing, *The Talented Student: A Validation of the Creativity-Intelligence Distinction*. New York: Holt, Rinehart, & Winston, 1969, by permission.



to have been the "motivating force" behind major class projects, such as the production of a magazine.

Wallach and Wing (1969), in an extensive and well-designed investigation, likewise found clear relationships between measures of ideational fluency and creative products among a sample of about five hundred college students. Looking at attainments such as prizes in art and science contests, political leadership, roles in major dramatic productions, and awards in the fine arts, they found that while differences in intelligence test scores failed to predict any kind of *nonacademic* attainment, ideational fluency did predict accomplishments in many areas (see Figure 13–6).

In one of the first longitudinal studies of creativity, Kogan and Pankove (1972) tested a group of tenth-grade boys and girls who had been tested five years earlier as fifth-graders. Although the results were in many ways complex, they did suggest considerable stability in ideational productivity over the five-year span and also showed that some early measures of creativity were predictive of extracurricular accomplishments in the tenth grade. While the investigators are careful to avoid premature claims about the predictive power of any one measure, their findings do provide solid evidence that a person's creative ability is an important and more or less stable characteristic and can be discriminated from IQ. Such results give considerable impetus to efforts at fostering creativity.

FOSTERING CREATIVITY

The discovery that creativity can be identified as a characteristic that predicts accomplishment leads us to the practical question of whether it is possible to train for creativity. Evidence in this area is limited, but there are two sources to which we can turn for some preliminary information.

Family variables

One of the places where we can look for answers is in the retrospective accounts of creative persons; from these we can determine something of the background, home life, and pressures (or lack of them) that are associated with later accomplishment. Using this strategy, MacKinnon (1962) has reported that his sample of creative architects often received extraordinary respect from their parents, who expressed confidence in their ability to do what was appropriate. These same parents granted much freedom of exploration and decision, believing that their children would act independently, reasonably, and responsibly. At the same time, strong emotional parental ties were frequently absent. It was not only that closeness was lacking but that the overdependency and fear of rejection which often characterize parent-child relationships were not experienced. Fathers were models of effective behavior in their careers while mothers were active women with autonomous careers and interests. Furthermore, one or both parents frequently were of artistic skill and temperament.

As children, many of the architects showed early interest in painting and drawing; this was rewarded and encouraged primarily by the mother but was allowed to develop without undue pressures. There also was little parental pressure in regard to a particular career, even when parents were themselves architects. Nonetheless, within the family explicit rules and standards existed. Discipline was predictable and consistent and there was relatively little corporal punishment. Religious practices varied considerably, with two-thirds of the families practicing only perfunctory or no formal religion. Emphasis was placed instead on the development of one's own code of ethics, with integrity, pride, joy in work, intellectual and cultural endeavors, success, ambition, and doing the right thing being highly valued.

Reports of shyness, isolation, aloneness, and little adolescent dating were frequent. MacKinnon suggests that this may have been related to the high incidence of moving or perhaps to unusual introversion or sensitivity. In either case, the apparent isolation may have fostered an awareness of inner life and interests in imaginal, symbolic processes.

Another investigator (Siegelman, 1973) has since looked at the relationship between parent behavior and the presence of creative potential in male and female college students. Those with traits suggesting they had creative potential tended to describe their parents as more rejecting than loving. In contrast, students with less creative potential often described their parents as more accepting and affectionate. Siegelman's findings are consistent with those of other studies (Arasteh, 1968; Domino, 1969) showing that usually there is little warmth between creative individuals and their parents. One possible reason for this consistent finding is that children with loving parents tend to accept parental attitudes and thus become somewhat conformist. Cooler and less-accepting parents, on the other hand, may encourage a rebellious attitude in their children that leads to independent thinking and action. This jibes with the isolation experiences described by MacKinnon.

Training for creativity We can look to experimental studies for evidence that creativity can be fostered by training. In a relatively early study, for example, Anderson and Anderson (1963) trained groups of sixth-grade boys to think of unusual uses for familiar objects by pointing out the unique properties of each object and then rewarding them for offering interesting possibilities. As hoped for, some generalization effects were observed. The boys were now able to generate more novel uses for other familiar objects that had not been included in the training series.

Another demonstration of the possibility of training in ideational fluency is found in a study by Yonge (1966). The criterion task was recognizing that an electrical switch could be employed as a pendulum—a distinctly novel use—to attach two strings which were hung from a ceiling in such a way that merely stretching one's arms would not succeed in tying them together. Without training, the subjects were unable to envision the possibility of using the switch in the string problem. When experience in novel use was provided, such as by showing the subjects that the switch could be used as a straightedge ruler to draw designs or as a holder for a piece of cardboard, many subjects were able to generate for themselves the possibility of using the switch as a pendulum.

How does one maximize the effectiveness of creativity training? No final answers are in, but there are a number of suggestive findings. According to one study, elementary school pupils whose teachers use indirect teaching methods (that is, by avoiding direct lecturing and encouraging students to express their own ideas) show more growth on various measures of creativity over the school year than do those whose teachers use a more direct approach (Soar, 1968). At the level of specific techniques, teaching children to break away from the commonplace in their descriptions of specially prepared pictures appears to be a promising strategy. In studies with economically disadvantaged elementary school children such a procedure has produced significant gains on verbal as well as figural measures of creativity (Khatena, 1971; Khatena and Dickerson, 1973).

Some researchers have even begun to develop curricula for creativity training. Reese and Parnes (1970), for example, have developed programmed materials—a sequence of twenty-eight booklets designed to teach the principles of creative problem solving—for stimulating cretivity in junior high school students. Their experimental evaluation of the program in six schools showed it to be highly effective (e.g., in producing greater flexibility and originality as measured by standard tests). Most interestingly, significant increments in creativity occurred relative to a control group even when the program was delivered in "do-it-yourself" form without a classroom instructor.

Throughout this book we have seen the vital role that rewards can play in developing many aspects of behavior. One team of investigators (Ward, Kogan, and Pankove, 1972) set out to determine whether such incentives could increase children's creativity. Participants were fifth-grade boys and girls from a predominantly black, urban, lower-class community. They began by taking several standard tests of creativity without any offer of rewards. Then each child was given another test of creative performance after being randomly assigned to one of three treatments: a control group that received no rewards, an immediate reward group that received a penny for each creative idea after verbalizing it, and a delayed reward group that was told that its members would receive a penny for each idea after they completed the task. Both reward groups did offer more creative ideas during this second test than did youngsters in the control group. Nonetheless, the relative order of the students did not change. Those who had few ideas without reward did not catch up with those who had many, and reward seemed only a minor facilitator of performance. Ward and his associates concluded that performance on measures of creativity reflect real individual differences in individuals' capacity for creative thinking, and that this capacity is more important than motivational variables in accounting for the wide differences that exist between people.

Overall, then, several demonstrations have shown that under certain circumstances one can train for creativity, but there is little likelihood that such training will produce more than moderate changes in creative performance. On the other hand, research on creativity has shown that until recently too much emphasis was placed on IQ alone as a basis for identifying people who are intellectually exceptional.

SUMMARY

The term *intellectually exceptional* includes not only the mentally retarded but also the highly gifted and creative. Mental retardation refers to subaverage functioning associated with impairment in adaptive behavior and can be subdivided into three categories: mild, moderate, and severe and profound. The mildly retarded can hold many types of jobs, depending on their social skills; moderate and severely retarded persons are usually institutionalized. Two distinct etiologies have been identified for retardation: (1) familial mental retardation, which involves no brain damage or physical impairment and may be viewed as the lower range of the normal IQ distribution, and (2) biologically caused mental retardation, which does involve some kind of chromosomal anomaly or brain damage. Due to a background of failure, retarded children are more motivated to avoid failure than to achieve success; they are also more motivated by material incentives, possibly due to neglect in the home environment. Modeling and reinforcement have been used successfully to teach the retarded academic lessons and social skills, but studies suggest that long-term training or continued reinforcement are required to maintain these skills in the more severely retarded. Mildly retarded children usually attend public schools and may be placed in regular or special classes. Studies suggest that retarded students learn at about the same rate in special or regular classes, but they are more likely to be socially rejected by peers if integrated into regular classes.

Terman's studies found that intellectually gifted children were superior to others in physique, health, and social adjustment as well as in their academic subjects. A follow-up of these children thirty years later found them still well adjusted socially and well advanced academically and professionally, with many publications and other achievements to their credit. Three alternatives for educating the gifted are acceleration, enrichment programs, and special grouping. One of the main problems of providing special programs for the gifted involves the criteria used for selecting students. Not enough of these programs have been sufficiently evaluated to determine which programs and which criteria have been most successful.

Creativity seems to involve something distinct from, or in addition to, high intelligence. One definition of creativity involves judging a person's products in terms of four criteria: novelty, appropriateness, transcendence of constraints, and coalescence of meaning. Studies indicate that one successful measure of creativity is ideational fluency, which predicted creative accomplishments in many areas. Several family variables have been associated with creativity, but the one identified in several studies is the lack of strong emotional parental ties—creative students tend to describe their parents as more rejecting than loving. Several demonstrations indicate that one can train for creativity. But capacity may be more important than motivational variables, and there is little likelihood that such training will produce more than moderate changes in creative performance.

The Socially Disadvantaged

CHAPTER 14

OUTLINE

WHO ARE THE SOCIALLY DISADVANTAGED?
EXPECTANCY AND SELF-CONCEPT
FAMILY STRUCTURE
  Extended Discussion—The Battered Child Syndrome
LANGUAGE OF THE SOCIALLY DISADVANTAGED
SOCIAL CLASS, CHILD REARING, AND COGNITIVE DEVELOPMENT
COMPENSATORY EDUCATION FOR THE DISADVANTAGED
EARLY EDUCATIONAL INTERVENTION
  Underlying Conceptualizations of Preschool Programs
  Structure versus Nonstructure
  Home versus School
  Selection 9—Early Intervention as Compensatory Education
SUMMARY

Recent years have witnessed increasing public concern with the plight of the socially disadvantaged. Psychologists, long interested in possible differences between individuals of varied social and economic backgrounds, have played a significant role in translating this concern into practical knowledge. Developmentalists have particular interest in trying to understand the relationship between development and factors unique to the disadvantaged. They also are increasingly involved in various remedial efforts. In this chapter, after identifying the socially disadvantaged, we shall explore factors that presumably are relevant to their development and then describe some ongoing programs designed for underprivileged children.

WHO ARE THE SOCIALLY DISADVANTAGED?

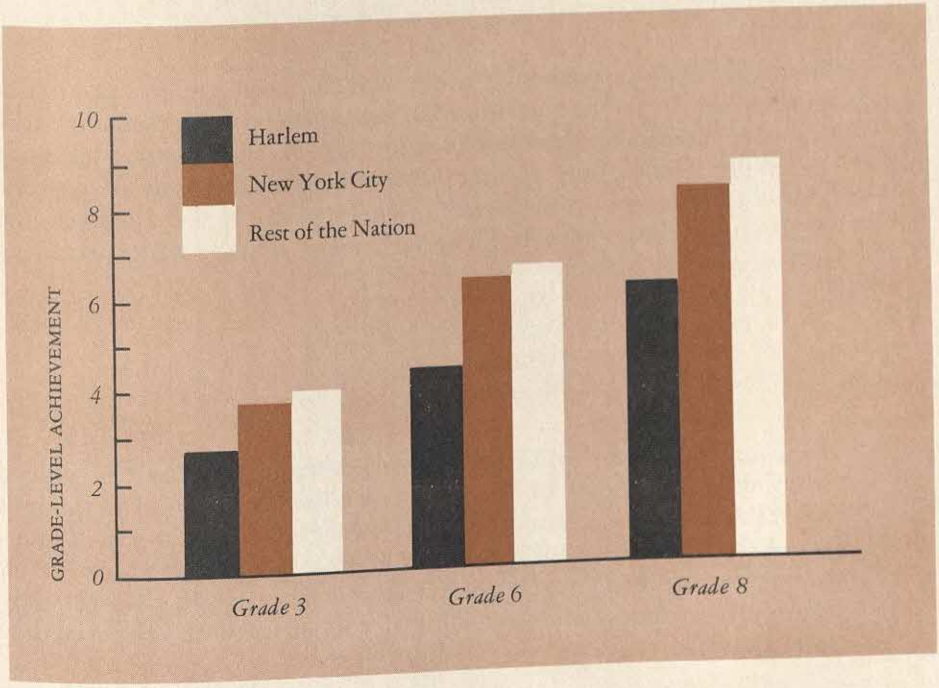
How can the socially disadvantaged be characterized? First, they are economically poor. The disadvantaged child is a product of poverty—or more accurately, is caught up in the self-perpetuating cycle of poverty and failure. Intricately involved in this cycle is a host of factors that play a part in preventing the poor from moving into the mainstream of society: crowded and inadequate housing, high rates of illness and malnutrition, family instability, delinquency and crime.

The disadvantaged are also more likely to belong to certain ethnic groups than others. Havighurst (1970) found that among the approximately 32 million individuals whose family incomes were below the poverty line, approximately 20 million were English-speaking Caucasians, 8 million were blacks, 3 million were of Spanish descent, and 500,000 were American Indians. Thus, most of the poor are whites, although minority groups are more frequently represented than their percentage in the total population would indicate. Blacks, for example, constitute 25 percent of those with very low incomes but make up a much smaller percentage of the population at large. Many of the disadvantaged, then, are exposed to prejudices commonly inflicted upon minority groups. Perhaps more important, their background—in terms of language, customs, and attitudes—may subtly prepare them for a life different from that of the middle class.

Finally, the disadvantaged are as a group less successful in school. Havighurst (1964) contrasted achievement test performance of middle- and lower-class children in twenty-one Chicago school districts. He found that sixth-grade students in the seven districts with the highest average socioeconomic status (SES) ranged from at grade level to one year above grade level on reading and mathematics tests; in the seven lowest SES districts, the test scores clustered around one year below grade level. The Coleman Report, an extensive survey made by the U.S. Office of Education, shows that black first-graders are already behind their white peers one full grade level, with the difference being most pronounced in the South (Coleman *et al.,* 1966). Moreover, an increasing gap between blacks and whites as they advance to higher grades has frequently been noted (Coleman *et al.,* 1966; Hess, 1970). As shown in Figure 14-1, whereas third-graders in Harlem perform about a year under grade level in reading comprehension, by eighth grade they are two years behind. The same basic pattern holds for word knowledge and arithmetic.

Many disadvantaged children, therefore, do not complete academic or vocational training and, in turn, are unemployed or underemployed.

FIGURE 14–1
Grade-level achievement in reading comprehension of third-, sixth-, and eighth-grade children from Harlem, New York City, and the rest of the nation. From Hess, 1970.



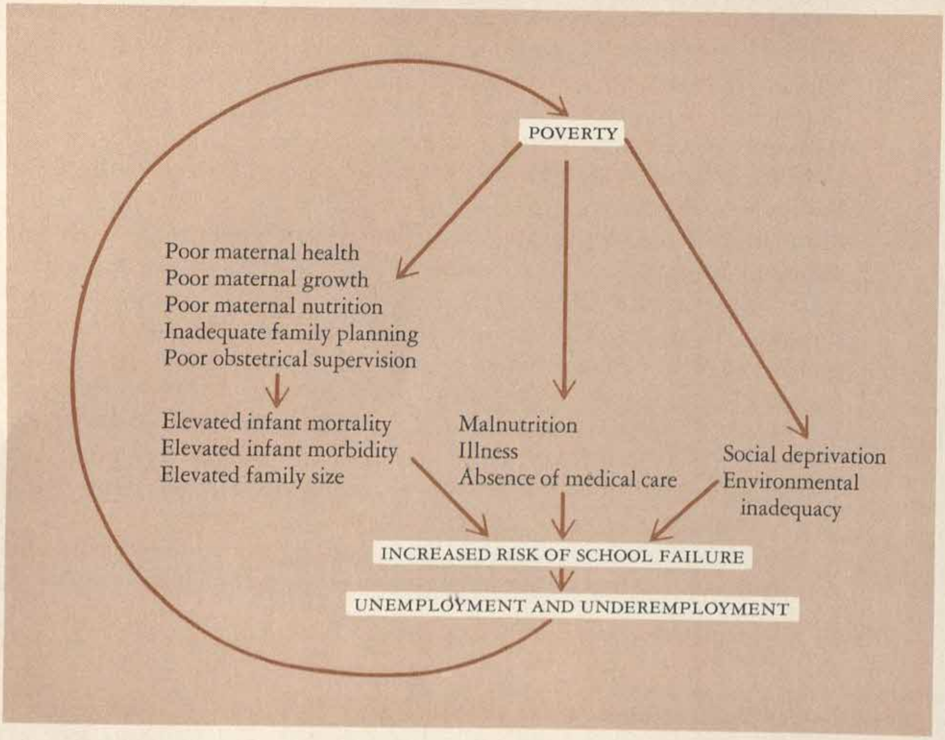


FIGURE 14–2
The cycle of poverty, school failure, and unemployment experienced by the disadvantaged. Adapted from H. G. Birch and J. D. Gussow, *Disadvantaged Children: Health, Nutrition and School Failure*. New York: Grune & Stratton, 1970, by permission.

Twice as many nonwhites as white workers in all age groups are unemployed, and the rate for nonwhite teenagers is two and one-half that for white teenagers (Birch and Gussow, 1970). The situation naturally precludes a rise from poverty—and completes the cycle of poverty, school failure, and unemployment (Figure 14–2). It also influences the expectations others have for the disadvantaged and the self-expectations of the poor themselves.

EXPECTANCY AND SELF-CONCEPT

Behavior frequently conforms to the expectations set for it by others. Thus, if a man were hired for a factory job but few in the plant thought him capable of performing the work, he might be likely to fail. A number of factors could be involved: co-workers might not help because "he couldn't learn it anyway," or, alternatively, they might be excessively alert for mistakes, exchanging "I told you so" glances whenever they found them.

Brophy and Good (1970) have provided telling information on the different ways that teachers interact with children for whom high and low success is expected. After asking teachers to rank their first-graders' level of achievement, the investigators selected the six highest and six lowest in each class for observation. Pupil-teacher interactions were carefully observed and records were kept of the frequency of various teacher and student behaviors, such as hand raising, providing correct answers, giving praise, and giving criticism. With those pupils for whom they held high expectations, teachers were more likely to praise correct answers, less likely to criticize wrong answers, more likely to follow wrong answers with a restatement of the problem (giving the child a second chance), and more likely to provide some kind of feedback after each answer. It seems reasonable to expect that the effect of such teacher behavior would be to improve future performance of those thought to be higher achievers and, conversely, to depress the relative standing of those from whom little was expected. Because achievement expectancy is usually low for the disadvantaged, teacher behavior will work against them. Although little research of this type has been performed in other settings, the phenomenon also may operate in occupational and social situations.

Aside from being influenced by expectations of others, performance also may be shaped by self-expectancy. We have already seen (Chapter 12) that children who expect to succeed tend to do so, and that expectations regarding one's control over situations is related to school achievement. What else do we know about the self-expectations of the disadvantaged child?

Despite the "melting pot" nature of the United States, it remains a country of many distinct and often antagonistic ethnic and social groups. If a group is disliked or looked down upon by much of society, its members might have a relatively unfavorable image of themselves. For stereotyping to have a negative effect, the individuals must first be aware of being a member of a disliked group. Available evidence indicates that this awareness occurs early, usually before the age of four, and that the tendency is more pronounced among minority-group members (Vaughn, 1964). Consistent with this analysis, Wylie (1963) found that blacks were more modest than whites in estimating their ability, and individuals of lower socioeconomic status were more modest than those of higher status.

Low self-esteem may then lead to poorer performance that, in turn, perpetuates low self-esteem. Rosenberg (1965) found that students who did not achieve high grades in school typically had relatively low self-images and low occupational expectations. In addition, they frequently described themselves as withdrawn, overly sensitive, and suspicious—qualities not likely to lead to experiences of success that might improve their self-concepts.

FAMILY STRUCTURE

A number of factors militate against the stability of lower-class families. Poverty itself is doubtless one important factor; individuals with inadequate incomes are harassed constantly by financial worries and tensions that strain marital bonds. In addition, the disadvantaged are frequently powerless to change the factors that affect their livelihood, or to save an adequate sum of money for emergencies or improvements. It is also unfortunate that under certain welfare systems it is easier for a mother to obtain financial aid when no man is present in the home.

The effects of such disruption are difficult to ascertain. It is reasonable to assume that children growing up in the absence of a father are deprived of a relevant model for behavior. But poor families, especially black ones, tend to live in extended families—that is, within a wide circle of relatives—rather than in the restricted unit of parents and offspring. Support and models are therefore potentially available from several sources. Furthermore, Herzog and Lewis (1971) warn that the influence of father absence on such specific areas as poor school achievement, delinquency, and sex identity is not firmly established and that its impact may be dwarfed by other factors.

Child neglect, however, is associated with low socioeconomic status, a one-parent family structure, and a large number of children. In an attempt to examine factors that might distinguish adequate mothers from neglectful ones, Giovannoni and Billingsley (1971) related interview data from 186 low-income black, Caucasian, and Spanish-speaking mothers to judgments of their adequacy as parents. It was concluded that current situational stress distinguished the neglectful mothers: they were likely to have more children, to be without a husband, to have experienced recent marital disruption, and to be poorer. Impoverishment of relationships with extended kin also existed among neglectful parents, while adequate mothers enjoyed frequent and rewarding contacts with relatives. In interpreting their results, the investigators suggested that poverty is not an "invariant concomitant of neglect. Rather, the implication is that poverty exposes parents to the increased likelihood of additional stress that may have deleterious effects upon their capacities to care adequately for their children" (pp. 332–333).

Related to neglect of children is child abuse, a growing concern in the United States. The problem has become sufficiently serious to warrant the undertaking of research aimed at determining its full extent and causes.

EXTENDED DISCUSSION

THE BATTERED CHILD SYNDROME

Although the first Society for the Prevention of Cruelty to Children came into existence in 1874 in New York City, recent concern about child abuse was precipitated in the 1940s by physicians' reports of unexplainable multiple-bone fractures and swelling and bleeding in the skulls of children (Gil, 1970). In a later description of 749 cases of child abuse, Kempe and his co-workers coined the term "battered child" to refer to children who had received nonaccidental physical injury from acts of caretakers (Kempe, Silverman, Steele, Droegemueller, and Silver, 1962). Child abuse clearly had become sufficiently startling to motivate professionals and the government to act. During the 1960s every state in the nation enacted laws requiring or recommending that health professionals report cases of suspected child abuse to state or local authorities.

One of the ways in which child abuse was startling, of course, was the very act itself. That adults would do noticeable physical harm to children who are defenseless against them and who are entrusted to their care is nothing short of repugnant to most people. And although some of the injuries are relatively mild, the range includes serious damage leading to death—children "have been beaten, burned with cigarettes, thrown downstairs, had their heads banged against walls and radiators, plunged into boiling water, suffocated, and otherwise tortured. . . ." (Earl, 1974, p. xi).

The victims are of all ages, from infants to adolescents. The very young (from one to three years), however, are more likely to receive serious injury that requires medical care, and thus they show up in hospital reports more frequently than older children. Throughout childhood slightly more boys than girls are victims, but at adolescence this reverses. Perhaps the physical growth of boys is at least partly responsible for this turn of events; on the other side of the coin, concern by parents and guardians over girls' sexual behavior at this age also may lead to arguments and physical encounters (Gil, 1970).

The extent of child abuse is difficult to estimate. Confrontations usually occur in the home, preschoolers are unable to report their troubles or perhaps their stories are not credible, and some victims undoubtedly are afraid to mention the situation. Abusers, too, are afraid or ashamed to tell the truth about their behavior. And physicians, at least until recently, have seemed amazingly unaware of the problem; of three thousand reported cases of child abuse collected from New York City's Central Registry, only eight had been reported by physicians (Light, 1973). Perhaps physicians have not wanted to become involved because some cases are difficult to identify. Injuries limited to bruises and the like can occur in any number of accidental ways. But even severe damage is sometimes difficult to identify as child abuse; parents may bring the child to the hospital with elaborate explanations of accidents that cannot be easily refuted by authorities. It is the watchful medical or social worker who notes that the story is suspect or that the child's X-rays indicate more than one broken bone in various stages of healing. Given all these considerations, estimates vary from ten thousand to two hundred thousand cases of abuse annually, a range so wide that it is almost useless. Regardless of its extent, it is the horror of the act that is overwhelming. And the question asked most frequently is, "What kind of people engage in child abuse?"

At the level of simple fact, the preponderance of child abusers are mothers of the victims—70 percent or more of serious abuse is attributed to mothers (Blumberg, 1974). This is undoubtedly because mothers spend more time with their children than do other people, so that the child is more available as a victim. It is also true that adoptive and foster parents, and paramours, are not involved in child abuse any more than are biological parents. But attempts to understand the phenomenon have gone beyond this kind of analysis to ask about the specific psychology of the abusers. From investigations largely clinical in nature, several facts and suggestions have emerged.

Gladston (1965) concluded from his examination of child-abusing parents of victims admitted to Children's Hospital Medical Center in Boston over a five-year period that a major role reversal was a significant feature. This role reversal—which Gladston termed "transference psychosis"—involved a gross distortion in the perception of the victim. The child was referred to as if he or she were an adult, often a hostile, persecutory one. One mother, for example, said of her three-year-old daughter, "Look at her give you the eye! That's how she picks up men—she's a regular sexpot." The father of a nine-month-old boy, a military police sergeant who had split his son's head, said "He thinks he's boss—all the time trying to run things—but I showed him who is in charge around here!" (p. 442).

Other investigators have reported that abusing parents had specific fantasies about the victim that were responsible for the injurious behavior: fear of punishment from the child, fear of the child's helplessness, fear of the child's seductiveness, and disappointment in the child (Terr, 1970). These fantasies are highly individualized and can sometimes be traced back to the childhood of the abusers.

Many child abusers were themselves abused and neglected as youngsters (Blumberg, 1974: Kempe *et al.,* 1962). Such experience is interpreted as resulting in incapacity to love, poor ego control, immaturity, poor self-concept, and impulsively violent behavior. Kempe *et al.* interpret the underlying mechanism as identification with an aggressive parent, a "do unto others as you have been done to" that involves the passing down of child-rearing practices from one generation to the next.

As compelling as some of these descriptions are, not all researchers are satisfied with them. Since the personality characteristics of some nonabusing parents are similar to those of abusing parents (Gil, 1970), the factors leading to the acts are complicated. Many of the interpretations put forth have been based on relatively small samples that may be unrepresentative, most being involved with psychiatric clinics, hospitals, courts, and children's protective services. These may be among the most serious cases of abuse, or they may reflect other bias in reporting.

Due partly to legislation requiring reporting of abuse, it is now possible to examine larger numbers of cases. One of the more extensive surveys has been conducted by David Gil, using 12,000 case reports collected from all over the United States during 1967–68. Gil studied 1,380 of these cases intensively, finding that

> The level of deviance (e.g., social, physical deviance, low IQ) of the children in the year preceding the reported abuse appeared higher than for randomly selected groups of children.
> At least half the children had previously been victims of abuse.
> The age of the parents varied widely and did not support previous findings that abusing parents are young.
> The educational level of the parents or substitutes was fairly low, and occupational status corresponded to educational level.
> The proportion of families with four or more children was almost twice as high as for families in the U.S. population (and was significantly higher among nonwhites compared with whites in the sample).
> The income of the families was very low compared with family income in the U.S. population in 1967.

To explore factors contributing to the *actual* attacks, Gil also prepared checklists of circumstances that were or were not present in any given case. Noting that child abuse is multidimensional, Gil summarized the analysis in this way:

> [The] basic dimension upon which all other factors are superimposed is the general, culturally determined permissive attitude toward the use of a measure of physical force in caretaker-child interaction. . . . A second dimension is determined by specific child-rearing traditions and practices of

different social classes and ethnic and nationality groups, and the different attitudes of these groups toward physical force as an acceptable measure for the achievement of child-rearing objectives. A third dimension is determined by environmental chance circumstances, which may transform an otherwise acceptable disciplinary measure into an unacceptable outcome. A fourth dimension is the broad range of environmental stress factors which may weaken a person's psychological mechanisms of self-control. . . . The final dimension is the various forms of deviance in physical, social, intellectual, and emotional functioning of caretakers and/or children in their care, as well as of the entire family unit to which they belong. [Pp. 135–136]

Based on these findings, Gil recommended that prevention of child abuse calls for massive change in the acceptance of violence against children, reduction of poverty, family planning, family counseling, and the like.

In interpreting Gil's study, it is important to remember that the proportion of child abuse among lower-class families may be inflated by the fact that lower-class cases are brought to the attention of the authorities more often. *Child abuse occurs among all social classes, and in each instance the child is disadvantaged.*

LANGUAGE OF THE SOCIALLY DISADVANTAGED

Comparison of the language of middle- and lower-class youngsters has frequently resulted in conclusions that the lower-class child is considerably deficient in many aspects of language development, such as sentence length, vocabulary, grammar, and syntax. Because language not only serves a communicative function but also is intricately involved in thinking, there is much interest in this finding.

One investigator, Basil Bernstein, recorded group conversations among lower- and middle-class British adolescents. He reported that lower-class individuals used longer phrases and hesitated less between phrases, almost as if they were stringing together a set of prefabricated ideas. Middle-class youngsters employed a great number of uncommon adjectives and adverbs, more unusual sentence constructions, and fewer diffuse pronouns such as *they* and *we* (Bernstein, 1962a, 1962b). Bernstein thus distinguished between *restricted* and *elaborated* language codes and argued that reliance upon the former by lower-class children limits their learning of conceptual skills. In restricted language there is a dependence upon a relatively small number of words and phrases, so that another individual will be able to predict fairly accurately what will be said and how it will be phrased on the basis of the situation. There is also little attempt to communicate fine nuances of ideas or feelings. Middle-class speakers are capable of using a restricted code, but additionally possess an elaborated structure with which they can express themselves more precisely. Relying implicitly on the theory that the way people talk influences the way they think, Bernstein contends that, lacking an elaborated code, lower-class youngsters have difficulty developing and applying abstract ideas. He also predicts that their power of analysis will be handicapped by their language.

Bernstein's theory has not gone uncriticized. Robinson (1965) argues that lower-class individuals are able to speak either in elaborated or restricted codes, but they do not feel compelled to use more formal language in experimental situations. To test this hypothesis, he instructed twelve- and thirteen-year-old English children to write two letters, one to a friend and the other to a school administrator. There were few differences between the middle- and lower-class letters written to the administrator; however, letters written by lower-class children to friends contained more restricted language. Robinson concluded that the difference resided in the type of speech used in everyday life rather than in any inability to use elaborated language.

Labov, Cohen, Robins, and Lewis (1968) studied the language of lower-class blacks in the United States. Observing adolescent residents of Harlem, they noted discrepancies between Standard English and black English. Among these are differences in use of the verb "to be," nonstandard use of verb forms, double negatives, and unusual use of pronouns. Labov *et al.* argue that these features do not indicate inferiority of the black language but merely *differences.* Such language follows consistent rules, and someone competent in the language can clearly discern what is meant by each statement. Labov *et al.* also note a richness in lower-class black language that does not manifest itself in the school setting, but rather in out-of-class verbal activity. Motivational and attitudinal factors and not language, they argue, are responsible for discrepancies in academic performance between lower-class blacks and middle-class whites.

Thus it is increasingly apparent that lower-socioeconomic-status blacks have developed a language that differs in several aspects from Standard English but is rich in its own right. However, it is unclear how this language is related to the type of conceptual precision required in school situations. It is also difficult to assess the extent to which lower-class language aids or hinders cognitive development. That lower-class members use uncommon adjectives and adverbs less often than middle-class individuals may be more directly related to their vocabulary and usage than to thought processes.

SOCIAL CLASS, CHILD REARING, AND COGNITIVE DEVELOPMENT

In Western society children spend most of their early childhood in the company of one or both parents. Child-rearing practices are likely, then, to exercise great influence on subsequent development. To the extent that familes of different SES vary in their modes of interaction, their children might be expected to develop in somewhat different directions and perhaps at different rates as well.

It has been suggested that differences among socioeconomic classes with regard to child-rearing practices may be partially explained by differential job experiences. Kohn (1963), for example, notes that one of the chief differences between the occupations of the lower and middle classes is the way they foster either self-direction or compliance. The lower-class occupations place more emphasis on manipulation of concrete things than on abstraction, ideas, and interpersonal relations; they are also more likely to be supervised and routinized, and to depend upon group efforts rather than individual initiative. As parents, lower-class adults may carry these experiences over to the way in which they control their youngsters.

Although extrapolation from this formulation should not be oversimplified, certain findings are not incongruent with it. Bronfenbrenner (1958) found that lower-class mothers more frequently punish failures of self-control such as toilet mishaps, are more likely than middle-class mothers to rely on physical punishment, are more concerned with appearances, and expect less independent activity from their children.

Robert Hess and Virginia Shipman (1965; 1968) have examined parent-child interaction with the specific intent of determining if and how it might be related to cognitive growth. They argue that patterns of socialization are rooted in the larger social and cultural matrix of which the family is a part, that as part of socialization practices children of poor families acquire a pattern of learning that is unadaptive in the classroom, and that these patterns are learned very early, primarily through maternal contact.

What is the pattern of learning that is hypothesized to characterize the lower class? It is a certain restrictiveness that precludes reflection, consideration, and choice among alternatives of speech, thought, and action. The child develops modes for dealing with stimuli and with problems that are impulsive rather than reflective, that deal with the immediate rather than the future, and that are disconnected rather than sequential. These modes, in turn, reduce the likelihood of achievement and success within the middle-class system.

According to Hess and Shipman, lower-class families are status oriented; that is, they accept the status quo and passive compliance to rules as unquestionable and appropriate. Status orientation underlies the restrictive mode of dealing with the world that is taught through mother-child interaction. Middle-class families, in contrast, are hypothesized to be person oriented. Because this approach emphasizes attention to individual feelings and roles, it leads to consideration of alternatives and variations rather than simple rule obedience.

To test these hypotheses, 163 black mothers and their four-year-old children were selected from four different social status levels: Group A came from college-educated professional, executive, and managerial occupational levels; Group B came from skilled blue-collar occupational levels, with not more than high school education; Group C came from unskilled or semiskilled occupational levels, with predominantly elementary school education; and Group D came from unskilled or semiskilled occupational levels, with fathers absent and families supported by public assistance.

The mothers were interviewed twice in their homes and were brought to the university for testing and for an interaction session with their respective children. During the latter, each mother was taught three simple tasks by a staff member and was then asked to teach these tasks to her child. The tasks involved grouping plastic toys by color and function, grouping blocks by two characteristics simultaneously, and working together to copy patterns on an Etch-a-Sketch.

One of the more striking results was the difference in language use between the middle-class mothers and those of the other groups when they interacted with their youngsters. Middle-class mothers had greater verbal output, spoke with more abstract words, and used more complete sentence structure. Following Bernstein's analysis of language (see p. 423), the investigators interpreted this finding as consistent with their view of lower-class restrictiveness of cognitive modes.

Equally important, mothers from different groups displayed the expected differences in orientation. To determine orientation of the families in their research program, Hess and Shipman asked mothers how they would deal with certain situations at school. As Table 14–1 shows, the interpretation of the mothers' answers revealed that the lower their social class, the more status oriented (and less person oriented) they were.

TABLE 14–1.
PERCENTAGE OF MOTHERS IN EACH SOCIAL CLASS WHO GAVE PERSON-ORIENTED AND STATUS-ORIENTED ANSWERS TO OPEN-ENDED QUESTIONS.

SOCIAL CLASS	PERSON ORIENTED	STATUS ORIENTED
A—Upper middle	36.92	27.78
B—Upper lower	31.65	36.92
C—Lower lower	26.43	40.69
D—Public assistance	20.85	51.09

Source: Adapted from Hess and Shipman, 1965.

The flavor of the influence of orientation is captured in mothers' replies to the question, "Suppose your child was starting to school tomorrow for the first time. What would you tell him [her]? How would you prepare him [her] for school?" Table 14–2 contains the contrasting

TABLE 14–2.
EXAMPLES OF CONTRASTING REPLIES OF MOTHERS WHEN ASKED WHAT THEY WOULD TELL THEIR CHILDREN PRIOR TO THE FIRST DAY AT SCHOOL

A	B
"First of all, I would take him to see his new school, we would talk about the building, and after seeing the school I would tell him that he should meet new children who would be his friends; he would work and play with them. I would explain to him that the teacher would be his friend, and would help him and guide him in school, and that he should do as she tells him to." [P. 96]	"Well, I would tell him he going to school and he have to sit down and mind the teacher and be a good boy, and I show him how when they give him milk, you know, how he's supposed to take his straw and do, and not put nothing on the floor when he get through." [P. 96]

Source: Adapted from Hess and Shipman, 1968.

answers provided by two mothers, one person oriented and the other status oriented. Mother A has provided numerous reasons that the child could use in deciding that school will probably be a pleasant and rewarding experience. While telling the child to obey the teacher, the mother has also given several reasons why this is a good idea. Mother B not only concentrates on a relatively minor aspect of the school experience but also gives the child little reason to look forward to school. There is no basis to form any expectation, and the child can only carry out a set of instructions for which he or she has not been given a rationale.

Finally, the mothers' performance of the tasks differed with social class, as did their teaching styles. When grouping objects, lower-class mothers were less reflective and grouped on a less abstract basis. As teachers, they did not define the tasks, provide information on how the tasks could be carried out, and inform the child what was expected. There was, instead, a reliance on nonverbal cues, such as pointing to locations rather than labeling (and conceptualizing) them.

It is important to note that all the measures described above were related directly to children's success on the tasks. Furthermore, there were no differences in emotional involvement among the groups of mothers. Overall, the investigation supports the general contentions put forth by Hess and Shipman. Gross differences appeared in the verbal and cognitive environments presented by the mothers, these differences appeared related to the proposed general aspects of social class, and they influenced the youngsters' task achievement.

COMPENSATORY EDUCATION FOR THE DISADVANTAGED

Education is obviously not a panacea for poverty. In fact, some researchers argue that it does little to ameliorate the situation (cf. Jencks *et al.,* 1972). Achievement in school can hardly mean success in life if opportunities for success are unavailable. Nevertheless, the schools continue to be seen by many as a powerful instrument for social improvement, and attempts are being made to restructure the old and add innovative programs. For example, changes in curriculum and method are occurring; these include an increase in flexibility, individualized programming, self-instructional materials, and emphasis on activities to overcome deficits in language and reading. New programs instituted range from extra tutoring after school to enrichment experiences such as visiting museums or attending camps. Underlying this approach is the assumption that disadvantaged children can benefit both by additional academic practice and by a widening of horizons. Frequently there is an attempt to include parents in the planning or implementing of these programs. Perhaps the most dramatic extension of schooling, however, is to be found in the recent emphasis on early education, as reflected in preschooling.

EARLY EDUCATIONAL INTERVENTION

Although schooling for very young children has been known in the United States for more than a century, it was confined largely to the middle and upper classes until the mid-1960s. Project Head Start, inaugurated in 1965 with federal funds, radically changed this state of affairs. Its thrust clearly was to eliminate the disparity that existed between lower- and middle-class children in intellectual achievement. From its conception Head Start was designed to prepare the disadvantaged child for school not only by offering preschool experience but also by providing health care and better nutritional standards and encouraging families to participate in the well-being of the child.

The rationale for preschooling grew from a convergence of sources: psychological theory that early experience is critical for future learning, investigations demonstrating that enriched environments raised the performance of animals on a variety of tasks, and the increasing awareness of the interaction of heredity and environment. The political climate of the 1960s was ripe, too.

> While behavioral scientists were beginning to speak their private thoughts aloud, the awkward American concern for relating politics with humanity was seeking something new to assuage our guilt and to provide a rallying cry for votes to support the Great Society. The rallying point became poverty and its truly iniquitous effects, and what aspect of poverty is better suited to attract the American voter than the disadvantaged child? From Harvard was heard [that] under proper conditions and instructions the child could be taught any task at any age. Regardless of the dearth of data to solidly support that hypothesis, society was handed a touchstone where political action and the frustrated drives of scientists, educators, and legislators could be joined at last. [Palmer 1969, p. 26]

In 1967 the federal government extended its funding to the Follow Through Program, aimed at slightly older children, and to parent-child centers designed to involve parents of youngsters under three years of age. Meanwhile, demands for extensive support for day-care services for employed mothers resulted in an even greater mushrooming of programs for the young.

At the present time many different compensatory preschool programs exist. Their innovators generally agree that early education is worthwhile, that disadvantaged children can learn under the "right" conditions, that motivation is important for learning, and that the young child should enjoy school experiences (Fein and Clarke-Stewart,

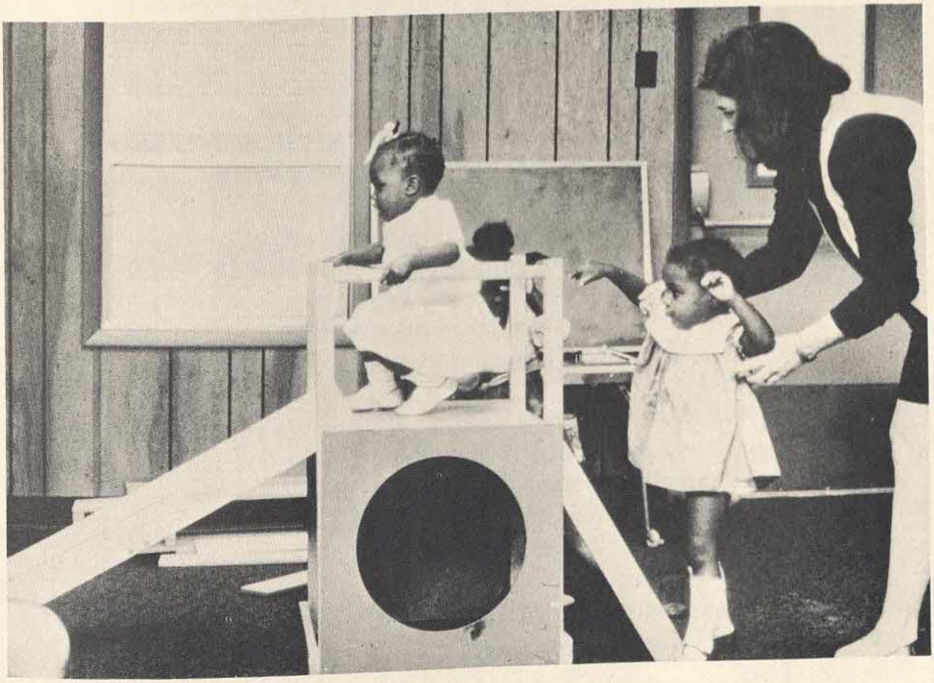


FIGURE 14–3
Scene from the Kramer School, depicting the development of motor skills in two-year-old children. Incorporated into the public schools of Little Rock, Arkansas, the Kramer School provides educational and day-care service to children from six months of age to the end of childhood. Courtesy Dr. Bettye M. Caldwell.

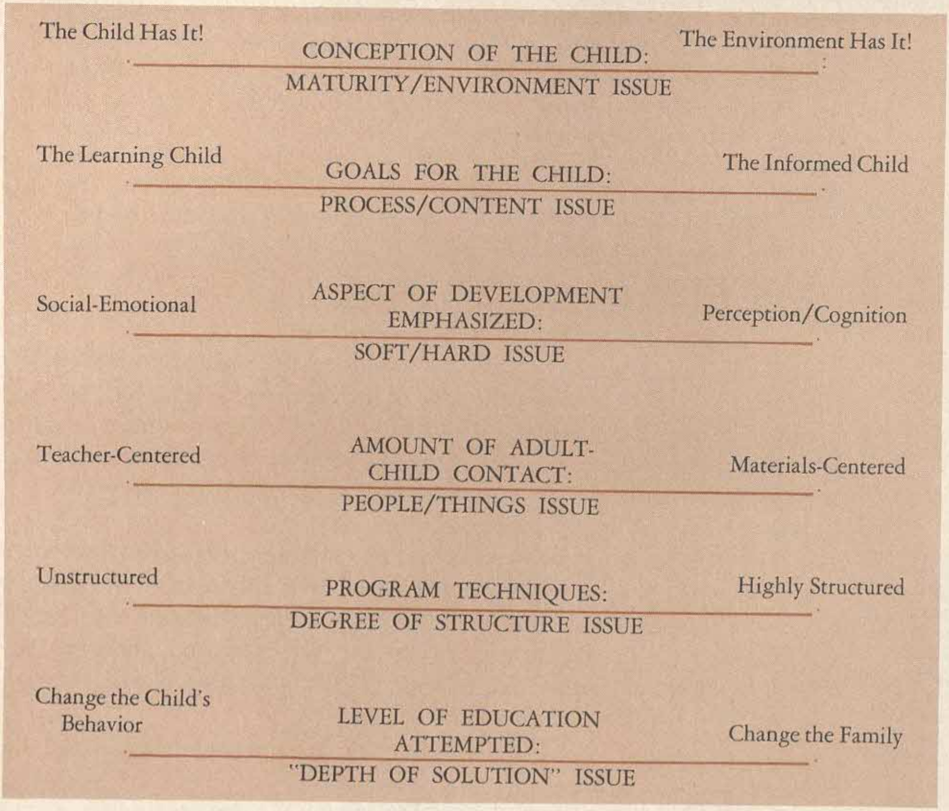


FIGURE 14–4
Six dimensions along which preschool intervention programs can be conceptualized. Adapted from Fein and Clarke-Stewart, 1973.

1973). Beyond that, however, considerable variation exists in the age of children selected and the setting, theoretical base, and underlying conceptualizations.

UNDERLYING CONCEPTUALIZATIONS OF PRESCHOOL PROGRAMS

In what major ways are programs conceptualized? Fein and Clarke-Stewart (1973) have identified six dimensions that are not necessarily independent but are sufficiently important to warrant separate consideration. Each dimension varies along a continuum, as shown in Figure 14–4.

1. Conception of the child. How the child is viewed as a human being is perhaps the most fundamental of all the dimensions, harking back to the maturational-environmental controversy. At one extreme, the assumption is that children are motivated by intrinsic forces to grow and learn. The educational setting thus should be an enriched environment that *allows* self-expression and creativity. This view, influenced by Gesell and Freud, has frequently been the cornerstone of traditional nursery school education. The environmentalist position, at the other end of the continuum, owes its basis to Locke, Thorndike, and Skinner. It holds that the intellect is plastic and under the control of the environment, that cognitive and moral knowledge and rules must be learned, and that education occurs from the outside. Between the two extreme forms is the interactionist position, which assumes that structural changes occur in the child, depending upon world experiences.

2. *Goals for the child.* Fein and Clarke-Stewart state that this dimension is perhaps most easily described by the question, "Should the child become an informed being or a learning being?" The goal of those who espouse the informed-being model is to prepare the child for school by stressing specific knowledge in language, reading, and arithmetic. On the other end of the continuum is a focus on the *process* of learning; the child must learn how to learn rather than acquire specific facts and skills.

3. *Aspects of development emphasized.* A third distinction among programs has to do with the focus of development. On the so-called soft side of the dimension, program innovators are most interested in socio-emotional growth. This approach was typical of the nursery school of the past, where it was successful in fostering independence, curiosity, self-reliance, and sociability. However, in its extreme form it has not been a popular model for the preschools for the disadvantaged, which focus more on perceptual/cognitive development. Language development is particularly central in this domain, as are Piagetian tasks. Between the extremes of this dimension is the "whole child" orientation that characterizes present-day nursery schools and the British infant school, as well as several compensatory programs.

4. *Amount of adult-child contact.* All educational programs obviously are directed by teachers, but the amount of direct contact between teachers and children varies a great deal. Some programs more strongly emphasize the child's manipulation of *materials;* one example is the Montessori approach, which emphasizes perceptual development, and assures that the primary role of the teacher is to provide appropriate material. Other programs emphasize personal interaction, with the teacher modeling certain behaviors, being shown things in the classroom, and verbally instructing the child. Interestingly, this dimension cuts across programs that group on other dimensions, and in general the focus on people rather than materials seems to be more successful.

5. *Program techniques/degree of structure.* The technique of education in preschools can vary widely from low to high structure. The latter clearly and rigidly prescribes lessons and the manner in which they are taught. Children in this kind of program are kept busy with such prescriptions, with a minimum of "free time." In contrast, low-structure preschools set no curriculum; they "let it happen" by providing quality personal relationships, a varied environment, opportunity for play experiences, and health care. The middle-of-the-road approach espouses a generally unstructured format within which structured lessons are interspersed.

6. Level of education attempted. Depth or level of educational attack also distinguishes preschools. There can be a direct approach to changing the academic and social behavior exhibited by the child, or, at the other extreme, an effort to build cognitive, affective, and social structures. Part of this dimension is the question of who or what systems should be changed. More specifically, many programs that aim at changing structures also adhere to the position that their goal can best be achieved by working with the family.

The general question of the effectiveness of early compensatory education has not yet been answered (cf. Bronfenbrenner, 1974). In the following discussion we shall briefly touch upon two issues that have been of primary interest and, within the relevant context, describe a few specific programs.

STRUCTURE VERSUS NONSTRUCTURE

Preschool curricula vary greatly in the amount of structure they impose on classroom activities. Some, usually those explicitly aimed at aiding the child's social and emotional development, leave the teachers the task of selecting appropriate activities. Others prescribe specific methods and content. Evaluating one unstructured program, Alpern (1966) found that there were no differences in readiness, attitudes, or communication skills between children who had attended it and those who had not been exposed to preschool. In addition, a comparison between two relatively structured programs—those of Karnes and of Bereiter and Engelmann—and one unstructured traditional nursery school approach found first- and second-grade pupils who had attended the structured programs achieving at a higher level than their peers who attended the unstructured one. It appears, then, that some degree of structure is desirable in preschool programs for disadvantaged children.

But can it be concluded that the more structure, the better the program? Before we answer this question, let us examine two programs, one highly structured and the other moderately structured.

The Bereiter-Engelmann preschool

Carl Bereiter and Siegfried Engelmann developed one of the more structured preschool programs for the disadvantaged (Bereiter and Engelmann, 1966). A typical Bereiter-Engelmann classroom consists of fifteen four- and five-year-olds and three teachers. The school day is two and one-half hours; language, reading, and arithmetic are taught for twenty minutes every day. Most of the remaining time is structured in small group sessions concentrating on music, writing, and vocabulary building.

Because Bereiter and Engelmann assign to inadequate language development an extremely important role in the classroom performance of disadvantaged children, much emphasis is given to language training. The curriculum underscores learning the kinds of words and phrases that are likely to be used by elementary school teachers. Oral presentation of material is rapid, with frequent opportunity for responses from the children both as a group and individually; feedback is directed at specific rather than global aspects of the child's performance. Thus, a Bereiter-Engelmann teacher would be likely to say, "That answer was good because it referred to what we talked about before" rather than stopping at "That was a good answer." The program also encourages children to speak loudly and clearly, a somewhat unusual approach inasmuch as most teachers of disadvantaged children spend considerable time trying to quiet their class. However, Bereiter and Engelmann have argued that disadvantaged children often fail to receive appropriate feedback because they mumble and are hard to understand.

The Bereiter-Engelmann approach makes frequent use of pattern drills, especially in identifying and labeling objects. The following passage represents the kind of pattern used:

> Teacher: This is a spoon. Is this a spoon?
> Class (in unison): Yes.
> Teacher: What is this?
> Class (in unison): A spoon.
> Teacher: Is this a knife?
> Leroy: No, it is a spoon.
> Teacher: That's right Leroy. It is a fork.
> Leroy: No, it's a spoon.
> Teacher: Oh, I guess that you're right.

As in this passage, teachers frequently err and praise students for correcting them. This serves the dual purpose of keeping the class on its collective toes and communicating the message that knowledge is power: students who try hard and pay attention can succeed where even the teacher has failed.

Children who participated in the two-year preschool program have shown impressive IQ gains. Bereiter (1972) also reported that kindergarten graduates of the program displayed second-grade levels of proficiency in reading and arithmetic and that they compiled better attendance records in regular classrooms than children not exposed to preschool training. This may indicate improvement in the attitude of the youngsters toward school. Perhaps most important, there is indication that the classroom superiority of participants in the program may last through the fourth grade.

The Gray-Klaus Early Training Project One of the first preschool programs, Gray and Klaus's Early Training Project (1970), involved poor black youngsters between four and six years of age who attended summer school for several years and with whom contact was continued on a weekly basis during the year. Spending half days at the center, youngsters worked in small groups of four or five to one teacher. Activities focused on two areas, one of which was attitudes toward achievement; it involved training such aspects as delay of gratification and persistence. The other focus was on fostering perceptual, cognitive, and language skills. In general, there was considerable emphasis on shaping desirable behavior with reinforcement, using both concrete rewards and social approval such as hugging. Overall classroom and curricula structure were moderate. Home visits were also provided in order to encourage families to motivate their children.

Intelligence and achievement tests were administered to the students at the end of first, second, and fourth grades. The results, which compared their performance with that of control youngsters from both the same locale and a distant city who did not participate in the program, showed that the participants were superior on intelligence tests, even three years after training ended. Achievement tests administered in the year following training also reflected benefits of having participated in the program, but these gains were not apparent three years after the program's end.

When the Bereiter-Engelmann and Gray-Klaus projects are compared, they seem to be equally effective. Other reports indicate the same basic finding. Weikart (1972), for example, compared his own cognitively oriented Piagetian curriculum, a language-training curriculum based on Berieter and Engelmann's work, and a more traditional approach. Somewhat to the investigator's surprise, in the first year of training children in all three groups showed substantial gains. But furthermore, even into the third year, no differences were apparent between the Weikart and Bereiter-Engelmann programs.

The reasons for similar impact of programs differing somewhat in structure (and initiated from quite different theoretical positions) may stem partially from similarity in actual areas stressed; the Gray-Klaus and Bereiter-Engelmann programs both emphasize use of language and proficiency in labeling familiar objects. What seems important is that *some amount of structure is beneficial,* perhaps because it channels the teachers' energies toward procedures and content that are valuable.

HOME VERSUS SCHOOL

The question of *where* early intervention takes place is a simplification of considerably more complex issues. Early reports of the efficacy of Head Start programs were not encouraging and resulted in attempts to intervene at an even earlier age. Because two- and three-year-olds create management problems in schools, many of these programs shifted to the home. But home-based intervention involved other considerations as well.

From a sociological perspective, if certain attributes of low SES are considered causative factors for poor academic achievement, it seems reasonable to try to modify these attributes. Focusing on the economic, social, and psychological problems found in many poverty homes, a social service model was applied in the hope that counseling and advice would ameliorate the situation, thereby fostering achievement. This approach, however, has not been effective (Hunt, 1969). Another model, involving parent-as-educator, emphasizes mother-child interaction more directly in terms of cognitive growth and social adaptibility. The feasibility of this model is apparent from investigations such as that of Hess and Shipman. Consideration of additional aspects of child development results in a broad-based model for early home intervention. The Verbal Interaction Program (VIP) of Phyllis Levenstein is an example of a program whose foundations are impressively drawn from such a base.

Levenstein (1970, 1975) provides the following as fundamental assumptions underlying VIP:

1. Parents are profoundly important as primary agents of change.
2. The mother-child affective on-going relationship is critical to learning, and should be disturbed as little as possible.
3. The ages between two and four years are important, if not critical, because mother-child attachment peaks and because the termination of the sensory-motor stage is a peak time for learning.
4. The motivational influence of love or attachment between mother and child will be optimized in a stable situation that encourages language, sensory-motor skills, and the child's intrinsic motivation to master the environment in play.

In its current form, the Verbal Interaction Program began in the late 1960s with the express purpose of addressing the cumulative academic deficit of lower SES children (see p. 417). It has involved two- and three-year-olds and their mothers, largely black; some of the children are now attending public schools. The general design includes pretests of the children on several measures, and annual assessment during and after participation in the program. Conceived of as a two-year project, each year's program consists of forty-six semiweekly, half-hour home sessions by interviewers called "Toy Demonstrators." The demonstrators, volunteer middle-class women or mothers who have previously participated with their children, are trained to show a mother, by participating in play sessions with her and her child, how to interact verbally to enhance the child's conceptual and social-emotional development. The demonstrators model verbal interaction techniques and interpersonal behavior related to learning. The focus of the sessions is on toys and books selected to meet an explicit cognitive curriculum. The curriculum is actually a list of concepts and behaviors illustrated differently by each toy or book. The role of Toy Demonstrator is indicated by the following excerpt.:

> Treat the mother as a colleague in a joint endeavor in behalf of the child. Share your verbal stimulation techniques with her by demonstrating them in play with her child; then draw her into the play, and take a secondary role as soon as you can while she repeats and elaborates what she has seen

> you do. Encourage her to play and read with the child between Home Sessions. Keep constantly in mind that the child's primary and continuing educational relationship is with his [her] mother; do all you can to enhance that relationship. . . . [Levenstein, 1970, p. 429]

The early results of this project were impressive. The youngsters entered the program with IQ scores in the 80s and 90s, and at its termination their scores were approximately fifteen points higher than the IQs of nonparticipating control children and their own mothers. This advantage was maintained into the second grade. Furthermore, since some of the children had not received the full two-year exposure, it was possible to show that intensity of the program is directly related to IQ gain. In a later report, Levenstein (1974) provided evidence of long-lasting positive effects on social-emotional development, indicated by teacher ratings of behavior deemed important to healthy growth. Teachers also reported that the program participants, more than the controls, were task oriented; they initiated, completed, concentrated on, and enjoyed mastering school tasks. Finally, teachers reported fewer academic problems for the participants.

These overall findings validate Levenstein's testing procedures and the general assumptions of the intervention. Bronfenbrenner, who strongly believes that compensatory education cannot be effective unless it incorporates the larger social-psychological context of the child's world, cites the Levenstein program as including the conditions "most conducive to development in early childhood" (Bronfenbrenner, 1974). There is little doubt that VIP is, indeed, a success. But does this mean that for the young child, school-like intervention alone is necessarily inadequate? In Selection 9, Francis Palmer and Thelma Semlear provide data that address this question.

SELECTION 9

EARLY INTERVENTION AS COMPENSATORY EDUCATION

Francis H. Palmer and Thelma Semlear

In the early 1960s the U.S. Congress passed legislation to create social programs for revitalizing the economically disadvantaged through a variety of educational opportunities. There were programs for adults who had been unable to complete high school. There were programs for training of specific skills required for employment. And there were educational programs for the very young. All of these programs were designed to express the nation's concern for the poor and the uneducated. They were motivated by the conviction that if the poor were given greater opportunities for education, they could then assume a more productive role in society.

The conviction about the programs for the very young was motivated by the assumption that if young children could be provided with certain experiences *before* they went to school, they would perform better in school. But what kind of experiences? Child development researchers were uncertain and could not agree upon the type of experiences that would most benefit young children. Animal studies had shown that early experience was very important for adult behavior, but they had little to say about what specific curricula might be most beneficial for the child.

THE ISSUE

It was within this atmosphere that Head Start was born. On the one hand, there was a belief that working with very young children would contribute to their subsequent school performance; and on the other, there was a lack of consensus with respect to the specifics of what should be taught. Consequently, Head Start did not attempt to prescribe for its individual programs what educational materials or procedures should be used. The people in charge of each program made the decisions about what was best for the particular children for whom they were responsible.

At the same time, the federal government began to support research designed to evaluate different ideas about what preschool curricula should include. Many of these studies showed that there were benefits to the children immediately after the intervention was over, but that those advantages disappeared a year or so later. Behavioral scientists disagreed on how to interpret these disappointing results. Arthur Jensen, a psychologist at the University of California, Berkeley, contended that "compensatory education has been tried and apparently has failed." He went on to argue that the basis for poor school performance was primarily due to a genetic component. To Jensen intelligence was inherited, the result of selective mating in our society. Blacks and the very poor were incapable of responding to compensatory education because over many generations they had become genetically inferior. The genes for high-level performance on problem solving and the manipulation of abstract symbols were missing.

Urie Bronfenbrenner, a psychologist at Cornell University, agreed with Jensen in that compensatory education has failed, but for a different reason. He argued that the amount of time children spent in compensatory education programs was insufficient to erase the debilitating effects of the child's total cultural experience. The ten to thirty hours weekly in a program were not enough to counteract the effects of the child's home environment. So, for Bronfenbrenner, the answer was to provide educational and cultural input to the mother, the family, and even the entire community.

Some psychologists disagreed with both Jensen and Bronfenbrenner. They contended that the disappointing results were not sufficient evidence to conclude that individual intervention with young children was ineffective. They argued that the existing studies had not exhausted the possibilities of what might be done. The early results might not be indicative of later results, available when children who had participated in the programs began to attend school. It was simply too soon to say that intervention was not effective. But ten years later some of the results of those longitudinal studies became available, and they suggested that working with an individual child under certain conditions can have long-term beneficial effects.

THE IDEA

Convinced that intervention, if given early enough, and under the right conditions, could have substantial effects on the child's subsequent school performance, Palmer, a psychologist at the City University of New York, reasoned that there were certain basic concepts that all children must learn first before they can deal with more complex concepts. Simple concepts such as *up, hard, long, under* and *same as* and their opposites—*down, soft, short, over,* and *different from*—would be learned sooner or later by every healthy child in the world. The environmental stimuli conducive to learning these ideas about *hard things, soft things, long things,* and so forth, were universally present in all environments. The earlier a child learned these and other simple concepts, the more of a head start he or she would have for learning complex concepts.

Several other assumptions were related to the learning of these concepts: (1) they could be learned best in a one-to-one child-instructor relationship; (2) minimal intervention would be sufficient—specifically, two hours weekly for eight months; (3) the child's parents must be fully aware and completely confident of what was being done to the child.

A proposal for the research to test these hypotheses was sent to the National Institute of Child Health and Human Development. A committee composed of child experts approved it, and the money to conduct the experiment was granted by that institute.

THE PLACE

It was decided to conduct the study in Harlem, an area of New York City that is home for the largest black population in the United States. Harlem had both rich and poor children, children of similar ethnic background, and a population density sufficient to provide the appropriate numbers of children necessary to conduct the research.

A second-floor loft was located in a building situated between a precinct station and a Catholic school on 126th Street between St. Nicholas and Amsterdam avenues. It was renovated for the purposes of the study and became the Harlem Research Center for the City University of New York. The renovated building included eight rooms, each adjacent to an observation room that afforded visual and auditory monitoring of the instruction.

THE CHILDREN

The research design required 310 black, male children born between 100th and 145th streets in Harlem between September and November of 1962. *Black* was defined as any parents who said that they were black. Males were chosen because it was thought that there might be differences between how boys and girls learn at that early age, and the money available and the research design placed constraints on studying both sexes—the choice was made by the flip of a coin. Other requirements for the subjects included that both parents speak English as a native language, that the mother had no history of syphilis or drug addiction, and that the child had weighed more than five pounds at birth.

Birth records were obtained for over 1,500 male children born in Sydenham and Harlem hospitals, both located in Harlem, over the months specified above. From the addresses on the birth records, the post office confirmed the addresses as being accurate for over 900. More than 700 interviews with parents within the homes were attempted, and over 550 were achieved. From those parents who agreed to participate in the study, 310 were chosen who met the specific requirements with respect to social class and the criteria of birth already stated. One or both parents were oriented for forty minutes during which they were told exactly what the study was for and what would be done with their children. Parents were asked to attend the first six visits with their child so that they would see and hear the instruction. They could come any other time that they chose to.

THE TREATMENTS

The 310 subjects were randomly assigned to the three groups—123 who were to be trained beginning at twenty-four months of age, 121 who were to be trained beginning at thirty-six months of age, and 66 who were to serve as control subjects.

The 123 who were assigned to be trained at twenty-four months of age were given a measure of concept achievement, the Concepts Familiarity Index (CFI), to determine how many of the concepts to be taught each had already learned. On the basis of how many concepts the children already knew, they were assigned to either the Concept Training group or the Participating Control group.

The Concept Training group

The 61 twenty-four-month-old children assigned to the Concept Training group (34 lower class and 27 middle class) were taught the concepts under structured conditions. The curriculum was designed to present the easiest concepts first (on the basis of the percentage of children who had demonstrated they already knew them on the CFI) and the most difficult ones late in the program. In this manner *on top of*, which 94 percent already knew, was taught first; and *next to*, which was known by only 11 percent, was taught in the late part of the two-year-olds' curriculum. Forty concepts in the following categories were in the two-year-olds' curriculum: *size* (e.g., big-little), *touch* (e.g., hard-soft), *motion* (e.g., stop-go), *position* (e.g., under-over), *surfaces* (e.g., top-bottom), *states* (e.g., open-closed), *sound* (e.g., noisy-quiet), *quantity* (e.g., one-many), *color* (e.g., blue-green), *form* (as with form boards, geometric inserts, and simple jigsaw puzzles), and *classification* (as in matching objects and pictures).

Four steps were involved in teaching each concept:

1. *Teacher shows*—The teacher explains to the child that they will play a game with washcloths both wet and dry. She points out that the dry washcloth cannot be used to wash the baby doll. She puts the cloth in water and explains that now it can wash the baby because it is wet, etc.

2. *Teach and child do*—As the teacher and child bathe the doll, they talk about things that are wet and dry and discuss the properties of wetness and dryness.

3. *Child shows*—When Step 2 is completed, the teacher asks the child (a) to show her something *wet* and *dry*, and (b) to *wet* and *dry* something with the washcloths.

4. *Child says*—The teacher encourages the child to verbalize the concept that he is able to recognize and demonstrate. If he is not yet verbal, she encourages him to gesture or to act out the scene.

The Participating Control group

The 62 children in the Participating Control group, hereafter referred to as the Discovery group, obtained the identical instructional setting except that the Concept Training curriculum was not used; instructors were told not to initiate conversation with the child but to respond verbally and with gesture as long as he initiated conversation verbally or by gesture. The children received the same toys to play with as were used to teach the concepts. They had the same instructors except that the instructors treated the children differently. The children attended the center on the same schedules. Studies conducted during the program showed that the instructors refrained from initiating conversations with these children and did not verbalize the concepts when they did talk.

The nonparticipating control group

The 66 nonparticipating control subjects attended the center in June and July of each year and were assessed with the same measures at the same age as the participating children. They did not participate in the program as recipients of either Concept Training or the Discovery condition.

A year later the 121 children to be trained at the age of thirty-six months were subjected to identical procedures as had been used the year before for the twenty-four-month-old children. The only treatment difference was that the concepts taught in the curriculum were more difficult. The concepts that had been known by most two-year-olds were dropped out of the three-year-olds' curriculum. Other more difficult concepts were added to the latter part of the curriculum. By September 1965, the 310 children had been trained as two-year-olds, or had been assessed as controls, or were in training as three-year-olds.

THE PROCEDURE

When a child entered the center for his instruction, the teacher was waiting for him with a lesson plan. The teacher knew which concepts he had completed and which ones he would be exposed to next. She had decided which materials were best for that concept, drawing from her knowledge of the toys that child liked to play with. After each lesson, she recorded which concepts had been taught and how far along he was with each. Record keeping was a major part of each teacher's responsibility. Programmatically this was important so that each child obtained the instruction he was ready for; for research purposes, precise record keeping was essential.

THE EVALUATIONS

The research design called for an evaluation of the cognitive functioning of each child at the end of his training program and annually thereafter. The nonparticipatory controls were assessed at the same age as the participating groups were. A battery of individually administered tests was used to determine aptitude and intellectual achievement. Assessments for all groups occurred until age four years and eight months, and some children were evaluated at age ten.

THE RESULTS

Selection of subjects

Any study of this kind must determine whether the children who actually participated in the program were representative of the larger population from which they were drawn. That question can be answered in several ways. The children were healthy at birth and at the time interviews occurred, or they were not selected to participate. They did not represent the entire Harlem community with respect to what Gunnar Myrdal in his *American Dilemma* described as "the underclass." The underclass are those children born without the benefit of hospitals and doctors; children whose parents are drifters in the society; children who live the first few years of their lives in the back seat of cars and in cheap boarding houses, the census for whom is never taken. Just what proportion of our population is comprised of such families is not known, since they defy counting. To receive a welfare check, for example, one needs a permanent address. In this sense those on welfare are not the lowest socioeconomic level of our people. This study included children whose parents were on welfare, but not those described above as the underclass.

Among the children who participated in the program at age two, were there differences between lower-class (LC) and middle-class (MC) parents with respect to who was contacted and who participated? Of the MC parents for whom interviews were attempted, 87 percent were interviewed, and 80 percent of those signed the statement of intent. Of the LC parents, 82 percent of those attempted were interviewed, and 78 percent of those signed the statement. Of those who signed the statement, 75 percent of the MC children and 68 percent of the LC children ultimately participated in the program. Because originally there were more LC children in the potential sample than MC children, the children who ultimately participated were well balanced—54 were MC and 69 were LC.

Among the children who participated at age three, of the MC parents for whom interviews were attempted, 83 percent were interviewed and 73 percent of those signed the statement of intent. Of the LC parents, 80 percent were interviewed and 90 percent of those signed the statement. Of those who signed the statement, 78 percent of the MC and 66 percent of the LC participated. Forty-five percent of both MC and LC who were initially contacted ultimately participated in the program. Clearly, no bias existed with respect to social class and participation.

The control sample differed from the two participating samples in that only 61 percent of the control subjects were actually contacted and interviewed, a smaller percentage than was true for the participating groups. That was the result of a large subject pool (potential participants) and a smaller number of children required, not because it was more difficult to contact the control parents. Of the families interviewed, 74 percent signed the statement of intent, lower than the percentage found for the participating groups, but surprisingly high when it is considered that the control children would not have the advantages of a training program, only the experience of annual assessment.

Thus the final sample was as equal as one could expect, considering the complexities of sample selection.

Training and discovery

Once the sample for either age was selected on the basis of socioeconomic status, the children were assigned to the Training or the Discovery condition on the basis of their knowledge of the basic concepts with which the Training condition would deal. The children in those two conditions were, on the average, equal with respect to their scores on the Concept Familiarity Index, which measured existing knowledge of the concepts in question.

The instructors followed instructions about the Training and Discovery conditions. They distinguished between the instruction the children in the two groups should receive. For example, it was shown that eight times more conversation was used by them to initiate interchange with the child in the Training group than in the Discovery group.

Effects at age two years and eight months

Fifty-one of the Training group and 44 of the Discovery group (a) completed the program, (b) were available at the time of assessment, and (c) completed the entire test battery during assessment. Fifty-seven of the original 66 Controls met (b) and (c) above. Twelve of the original 123 who participated in the program did not complete the eight months because they dropped out, moved, or were ill at the time of assessment.

The two participating groups and the control group were examined at thirty-two months of age.

To determine their relative performance immediately after the two-year-old's training was completed, the following measures were used at 2/8: knowledge of body parts, persistence in a boring task, the CFI, the Peabody Picture Vocabulary Test (PPVT), the Stanford-Binet IQ, the ability to follow instructions, delayed response, simple perceptual discrimination, a measure of motor ability, and labeling.

Both Training and Discovery groups outperformed the Control group on the CFI, the Stanford-Binet, simple perceptual discrimination, motor performance, and labeling. Only on delayed response did the Training group outperform the Controls, and the Discovery group was superior to the Controls on the PPVT. The Controls outperformed neither the Training nor the Discovery group on any measure.

However, when the Training and Discovery samples were compared, the Training group outperformed the Discovery only on the CFI, the measure specifically designed to test what the curriculum was about. No other differences existed between the two participating groups.

It was concluded that participation in the program was effective with respect to cognitive performance immediately after the program terminated, but that no particular beneficial effects had been derived from the Training condition as compared with the Discovery condition.

Effects at age three years and eight months

Forty-five Training and 38 Discovery of those trained at age two were assessed at 3/8; and 97 of the original 121 who began training at age three (a) completed the program, (b) were available for testing, and (c) completed all measures administered in the test battery. Fifty-six of the original 66 Controls were assessed at that time as well.

At that time, one year had elapsed since those trained at age two had visited the Center. Those trained at age three had just completed the program.

One year after the termination of their training, the children trained at age two continued to outperform the Controls on the CFI, labeling, form discrimination, and motor performance. The Controls did not perform better than either of the participating groups on any measure. The Training group outperformed the Discovery group on the CFI only, and the Discovery group did not outperform the Training group on any measure.

Those children participating at age three, compared with the Controls immediately after training was terminated, outperformed the Control group on the CFI, the PPVT, Stanford-Binet IQ, simple perceptual discrimination, and motor performance. The Training group was superior to the Discovery group on the CFI.

Effects at age four years and eight months

Forty-five Training and 43 Discovery who participated at age two were available for testing and completed all measures at age 4/8. Of those who were trained at age three, 53 Training and 46 Discovery completed those measures. Forty-six of the original 66 Controls completed assessment at that time.

At age 4/8, two years had elapsed since those trained at age two had finished their participation, and one year had elapsed since those trained at age three had finished. They were, as before, compared with the Control group, and the differences between Training and Discovery were examined.

Two years after participation in the program, those trained at age two were superior to the Controls when a composite of all ten measures given was used as a basis of comparison, but they did not differ on any single measure. No differences existed at this age between the Discovery and Training groups.

One year after participation in the program, those trained at age three outperformed the Controls when all ten measures were considered together, but the only individual test on which they were superior was the WPPSI performance measure.* No differences existed between Training and Discovery.

Thus, at this point in the study two things were clear: (1) while the effects of training were still discernible across all measures administered, those effects were no longer strong enough to be manifest on individual measures of performance; and (2) no differences existed between the two participating groups—those who had been exposed to the curriculum and those who had not.

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*Wechsler Primary and Preschool Scale of Intelligence.

Effects at age ten

Between ages 4/8 and 10 none of the children in the Harlem study were assessed to determine whether the effects persisted. Those who argued that individual intervention was inadequate for durable effects influenced money-granting agencies, and funds were not available to satisfy the original requirements of the research design that a final evaluation be made in the first grade. That analysis was never done, but 90 children of the original sample were assessed when they were ten years of age. Reading scores were obtained for most of those children at the third-grade level.

There can be no question but that the results at age ten are the most important. That the entire sample was not assessed is lamentable, but the conditions under which the 90 were assessed provides interesting information about the effects of individual intervention at a young age on subsequent school performance.

How the sample of 90 was obtained

Of the 310 children in the original sample, 267 had been assessed at some time after the training program terminated. Letters were sent to their parents asking them to call and make an appointment to bring the subject in for assessment at age ten. Of 267 letters sent, 68 were returned undelivered. Of the 199 delivered, 90 responded to the initial letter and were subsequently involved in an entirely different study which included (a) the administration of the Wechsler Intelligence Scale (WISC), the PPVT, other measures not relevant to this discussion, and (b) the third-grade reading scores for each individual.

Reading levels at age ten

Children who participated in either the Training or Discovery groups at ages two and three were on the average three months ahead (on the M.A.T. reading test) of the median scores of their individual schools at age ten. That finding is particularly impressive, since the sample was composed of boys. Girls, in general, are two to four months ahead of boys in the third grade on the Metropolitan Achievement Test. The medians obtained for each school (in which the subjects were registered) included from 2 percent to 80 percent non-black children. In general, black children are poorer readers in the third grade than their peers. A conservative estimate of the performance of those children who were involved in the Harlem Center as compared with other black boys in Harlem is that they are six months ahead in their reading level. No differences were found in the reading level of those who had been exposed to the Training and Discovery groups, but those children trained at age two were found to be a month ahead of those trained at age three.

Intelligence scores

The test of so-called intelligence used at age ten was the Wechsler. The average score for those children who had participated in the Harlem study was 100.8, approximating the national norm for that measure and considerably higher than what is generally reported for black children in the third grade. No difference existed between the Training and Discovery groups, and no difference existed between those children trained at age two and those trained at age three.

CONCLUSIONS

While it is always with some caution that generalizations can be made from a single study, the Harlem study appears to cast reasonable doubt on the positions of Jensen and Bronfenbrenner and leaves open the possibility that individual intervention at an early age can have durable effects on the cognitive development of the child. At ages 2/8, 3/8, and 4/8 the effects were clear, although it could be argued that they appeared to be less discernible at 4/8. The data at age ten, however, indicate that when reading is measured and when intelligence is measured, durable effects are discernible for at least seven or eight years.

The lack of differences between the Training and Discovery groups at all subsequent stages of development after training has some clear implications as well. The Concept Training program per se cannot be said to have brought about the effect. Since the conditions for the Training and Discovery groups were identical except for the concept curriculum, one must conclude that both treatments were responsible for equal effects or that the conditions common to both groups were responsible. Both groups had the one-to-one teacher-child interaction, both had two hours weekly with the same materials, the same instructors, and so forth. The one-to-one situation, the regularity of training, the ambiance established by the personnel of the Harlem Research Center, may have all contributed to the effect.

Whether the program was more effective at two or at three years of age is inconclusive. At age ten the difference between the groups trained at both ages was the slight advantage those trained at age two had in reading.

In summary, the Harlem study suggests that early intervention of the types described here may have durable effects on the child's reading ability and performance on standard intelligence tests. What other condition of intervention may work as well or better, and what other aspect of human behavior are influenced by compensatory education, must await the results from other longitudinal studies.

It appears, then, that school-like intervention for the very young may still be a viable model for early intervention. In comparing Levenstein's and Palmer and Semlear's programs, an important point is that both emphasize a one-to-one interaction around material that easily elicits conceptual training. The notion that mothers cannot be substituted is perhaps not a valid one, at least in its extreme form; any caring adult who interacts in particular cognitive-social ways may be the critical factor. Home intervention does have certain potential advantages: mothers may generalize their learning to other offspring and may themselves gain in self-confidence, in interest in the world, and in their own development (Bronfenbrenner, 1974). At the same time, there is a need for variety in programs to meet the variety of circumstances that exist.

SUMMARY

Socially disadvantaged children are the economically poor who suffer the effects of inadequate housing, high rates of illness, and malnutrition. Most of the poor in the United States are white, but minority racial-ethnic groups are overrepresented. Disadvantaged children tend to be unsuccessful in school from the beginning and fall further behind throughout the school years. This, in turn, leads to underemployment or unemployment, and eventually more poverty.

It is likely that the expectations that others hold for the socially disadvantaged work against them. For example, Brophy and Good demonstrated that teachers interacted differently with students whom they ranked as their highest achievers and those whom they ranked as their lowest achievers. The manner of interaction seemed to foster the discrepancy between the groups. Evidence also exists that the disadvantaged rate their abilities as relatively low and have low self-esteem—factors that undoubtedly increase failure.

Lower-class families are not as stable as other families, although the extended family, especially among blacks, may reduce negative consequences, for example, of fatherless homes. Low SES, one-parent households, and number of children are related to child neglect, however. Among the poor, neglectful mothers are distinguishable from non-neglectful mothers by the amount of situational stress they are experiencing.

Child abuse occurs within all social classes and has become sufficiently serious to warrant laws requiring the reporting of all cases. Child abusers most frequently are mothers of the victims, and evidently they grossly misperceive the victims or were abused and neglected themselves. Gil's examination of a large sample of reported abuse revealed that the families tended to be of low income, educational, and occupational levels and had several children. He concluded that many dimensions are involved in abuse: acceptance by the larger culture of physical force on children, specific attitudes of social classes and ethnic groups about such physical force, chance events, environmental stress, and deviant functioning of caretakers, children, and families.

The language of the socially disadvantaged is widely recognized as different from that of the middle class. Bernstein has argued that the lower-class child uses restricted, rather than elaborated, language that limits intellectual development. Others contend that lower-class language is rich in its own right and is not deficient.

The socially disadvantaged may have unique occuptional and child-rearing practices that influence development. Hess and Shipman contend that socialization is rooted in the sociocultural background of the family and that specific mother-child interaction sets the course of cognitive development that is unadaptive to the classroom. Their study of black mother-child pairs of four economic groups supported their reasoning: compared with middle-class mothers, lower-class mothers were status oriented, limited in language, and interacted with their children in a nonverbal, less conceptual and informative way.

Considerable effort has been expended to ameliorate the problems associated with poverty by special educational programs, particularly preschool programs that vary along several dimensions. Of special interest has been the amount of structure of a program; it appears that some structure is beneficial. A more recent consideration is whether very early intervention (at two or three years of age) is more effective when it is conducted in the home rather than in a classroom setting. Levenstein's home-based program is strikingly successful, but Palmer and Semlear report some gains from their school-based program. These programs are similar in that they both emphasize one-to-one interaction around materials that foster conceptual development.

Behavior Problems of Childhood

CHAPTER 15

OUTLINE

CHILDHOOD PSYCHOSES
  Childhood Schizophrenia
  Early Infantile Autism
  Etiology of Childhood Psychosis
  Prognosis: What Happens to the Psychotic Child?
NEUROTIC REACTIONS IN CHILDHOOD
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SUMMARY

In this chapter we turn to behavior problems in development—"abnormal" behaviors whose psychological, emotional, or social aspects are considered particularly central. Rather than attempt an exhaustive treatment of the subject, however, we will focus on the major types of problems that children display. As in earlier chapters, our interest goes beyond mere description, for we also are concerned with how these problems can be dealt with and overcome.

To set our course, it should be pointed out that children, unlike adults, rarely initiate their own treatment. Parents, or perhaps school authorities, first suspect that "something is wrong" and seek help in diagnosing and in treating the problem. They may note that the child's behavior appears to lag behind that of his or her peers, that behavior has suddenly changed in some way, that ongoing difficulty in social relationships exists, or that, in extreme cases, behavior seems qualitatively different from that of most children. The most severe disturbances are generally referred to as *psychoses,* and the relatively less profound are referred to as *neuroses.**

CHILDHOOD PSYCHOSES

There are many definitions of the word *psychoses;* they vary widely and are often used inconsistently. For our purposes, *childhood psychoses* will refer to the entire range of very severe disturbances in behavior among the young. The major categories, as they generally appear in the literature, are *childhood schizophrenia* and *early infantile autism.* Sometimes the two diagnoses are considered to be quite separate, and at other times no distinction is made between them.

CHILDHOOD SCHIZOPHRENIA

Most broadly, schizophrenia is characterized by a defective interaction with reality that displays itself in disturbances in emotion, movement, perception, speech, thought, and social interaction. The schizophrenic child may thus show a variety of atypical behaviors, such as emotional withdrawal or overdependence, extreme joy and fear, strange mannerisms (finger twiddling, self-destructive head banging, peculiar posture and gait), disorientation in space and time, muteness, idiosyncratic verbalizations, and loose associations in thinking (e.g., Achenbach, 1974; Engel, 1972; Ross, 1974). Some of these disturbances—as well as their severity and pervasiveness—are conveyed in the following case study.

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*Some writers restrict the term *neuroses* to problems that have a clear basis in anxiety, but we shall not be concerned with this traditional distinction here.

THE CASE OF JANE

The patient, whom I shall call Jane, and her parents were first referred to our hospital when she was 5 years old, from another clinic where the parents had sought aid because of head banging since age 1 year, biting her arms and hands and slapping her face since age 4 years, and never having achieved bowel or bladder training.

Without detailing the parents' background prior to marriage, the development of their individual psychological difficulties and their summation after marriage, was apparent. . . . It was during a peak of parental tensions, shortly after the patient had begun to say single words at age 1 year, that her symptom of head banging began. Her development then became arrested and toilet training and learning did not progress significantly.

Physical and neurological examinations, repeated blood counts, blood serology, sedimentation rate, and urinalyses including phenylpyruvic acid testing were negative. Repeated chest x-rays were normal, as were x-rays of the skull. Skeletal maturation as measured by x-ray was normal. Repeated electroencephalograms revealed no abnormalities.

Psychological testing on admission and repeated twice during her hospitalization indicated that she was grossly retarded and seriously disturbed emotionally with marked self-punitive tendencies. Her lack of cooperation precluded any data that would allow conclusions about intellectual capacity.

At admission, the parents described Jane as non-verbal, but vocal, not toilet trained, unable to adequately care for herself, and having difficulties around sleeping and eating. They reported her persistence in hurting herself by intense, self-inflicted blows and they pointed out many marks and bruises over her body as evidence of long standing, self-destructive behavior.

During her first eighteen months, the nursing staff reported little significant change, and her attempts to hurt herself were unending. She not only hit herself with her fists, knees and feet, but bit her arms, hands, lips and tongue, and ground her teeth together. At times it was necessary for two staff members to restrain her self-hurtful behavior, but this proved so exhausting that it became necessary for the staff to rotate their time with her.

Other factors which added to the discomfort of being close to Jane were her habits of regurgitating food, picking at sores on her skin, urinary and intermittent fecal incontinence, and her monotonous groaning and wailing.

Meal times were also difficult and messy as Jane shoved food in her mouth with her hands, smearing herself and the surrounding area thoroughly.

> Bedtime was another area of stress. From admission on, Jane had been wrapped in a sheet and tucked in bed in order to prevent her self-hurtful attempts. Occasionally she spent the night in a side room because of her loud screeching.
>
> The structured activites of school, occupational therapy, picnics and outings also were often just one struggle after another.
>
> Fluctuations in her weekly weight grossly correlated with periods of regression and improvement, since during her more disturbed periods her refusal to eat required hand feeding by the staff. Losses or gains of as much as eight pounds within a week were evident and we found striking correlations between her weight, symptomatology, and factors such as intra-staff tensions, vacations of staff members or her parents, and changes in the assignment of staff working with her. [Gianascol, 1973, pp. 541–543]

Fortunately, the incidence of childhood schizophrenia is not high. Less than 3 percent of the children seen in outpatient psychiatric clinics and mental hospital services are diagnosed as psychotic (Kessler, 1966), and this figure is, of course, a good deal higher than one would find in the population at large.

EARLY INFANTILE AUTISM

In 1943 Leo Kanner described eleven psychotic children whose behavioral patterns during development appeared unique. Unlike most psychotic children, they had not withdrawn from the social environment; rather, they had never interacted with it, being "alone from the start." Kanner (1944) coined a new label for these children—*early infantile autism*—and noted that they encompassed about 10 percent of all psychotic children, more boys being affected than girls, as in all psychoses. Building on Kanner's work, Rimland (1964) has argued that aside from the earlier onset of the disorder, autistic children differ from other severely disturbed children in several important ways. For example:

1. Autistic children come from families in which there is a *low* incidence of familial mental dysfunction. Furthermore, the parents rate high in intelligence, education, and occupational level.
2. Autistic children are described as being unusually attractive and healthy.
3. Autistic children may have exceptional abilities in motor and manual skills. Some also display idiot savant characteristics; that is, they may perform unexplainable mental feats, such as immediately answering the question, "In which months during the year 1958 did the eighth of the month fall on a Wednesday?"
4. Autistic children have a need for sameness in their environment. They become extremely upset over changes viewed as quite ordinary by most people, such as a variation in the daily schedule.

5. Autistic children display severe language deficiencies. Approximately half of them are mute, and many of the remainder exhibit unusual language patterns. They may, for example, inappropriately repeat exactly the words spoken by another (*echolalia*), or they may incorrectly use pronouns, rarely using "I" or "me" but referring to themselves as "you" or "he" (*pronoun reversal*).
6. Autistic children rarely display abnormal EEGs (electroencephalograms), as do other psychotic children.
7. The "aloneness" of autistic youngsters is striking:

> Their pathology is soon evidenced . . . by their avoidance of another's eye and by a lack of visual or auditory response to others. They are deaf and blind to people. In retrospect one can detect the first signs of psychopathology in infancy. There was no social smile, no evidence of pleasure in the mother's company. One mother complained, "He didn't look at me when I fed him in my arms," and other typical complaints include,

TABLE 15-1
PERCENTAGE OF PARENTS OF AUTISTIC AND NONAUTISTIC PSYCHOTIC CHILDREN DESCRIBING THEIR CHILDREN IN CERTAIN WAYS ON RIMLAND'S CHECKLIST.

	AUTISTIC		NONAUTISTIC
DESCRIPTION OF CHILD	*Speaking* *N*=65	*Mute* *N*=53	*N*=230
It was suspected at some time that child was nearly deaf.	77	94	54
Child rather stiff and awkward to hold, age 2–5.	90	88	56
Child exceptionally skillful in doing fine work with fingers or playing with small objects, age 3–5.	71	75	33
Child fascinated by certain mechanical things, such as the stove or vacuum cleaner, age 3–5.	77	92	56
Child definitely gets upset if certain things he is used to are changed, age 3–5.	87	86	41
Child says "Yes" by repeating the same question he has been asked, age 3–5. (Example: If parent asks, "Shall we go for a walk, Honey?" child says yes by repeating, "Shall we go for a walk, Honey?")	94	12 (item not applicable to mute children)	22

Source: Adapted from Rimland, 1974.

> "He was never cuddley," or "He never noticed when I came into or left his room." There was no physical reaching out: the autistic child did not get set to be lifted into his parent's arms. There was no particular reaction to strangers either. [Kessler, 1966, p. 265]

In an attempt to establish early infantile autism as an independent syndrome, Rimland (1971, 1974) has requested parents to complete a specially devised scale describing eighty aspects of their troubled children's characteristics and behavior. The most recent analysis of the data covers 2,218 cases. Table 15-1 shows several items that distinguish autistic from nonautistic psychotic children, providing some support for Rimland's view. It has also been reported that children who display early infantile autism, as defined by Rimland's checklist, exhibit a particular blood reaction to serotonin, a neurotransmitter, that is different from that of normal and nonautistic psychotic children (Rimland, 1974). Although it is too early to interpret this result, the line of investigation bears watching.

ETIOLOGY OF CHILDHOOD PSYCHOSES

Just as there are diverse definitions of childhood psychoses, so too are there several proposed etiologies. Many investigators tend to believe that organic dysfunction is central. Lauretta Bender, noted for her many years of work with psychotic children, attributes psychotic behavior to physiological defect, reduced competence, and anxiety. Biological disturbance is evidenced, according to Bender, by symptoms such as growth abnormalities, atypical commencement of puberty, excessive flushing and pallor, excessive reactions to infections, and disturbances in eating (cf. Bender, 1947). Bender suggests that the tendency for psychoses is genetically determined but is brought on by some kind of physiological upset.

Rimland (1964) suggests that autism is actually genius gone awry; that is, that autistic children are predisposed to superior development in such a way that they are also especially susceptible to damage from lack of oxygen. When such anoxia occurs prenatally or at birth, it affects the reticular area of the brain, which, in turn, impairs the ability to associate new stimuli with remembered experience. Thus a change in environment is difficult to interpret, warmth toward caring parents does not develop because parents do not become secondarily reinforcing, and, in general, there is lack of meaning in the world.

The view of Bruno Bettelheim (1966, 1967) stands as an example of a contrasting hypothesis in its emphasis on psychological determinants. Bettelheim believes that autism and/or psychosis is a withdrawal from a world that was traumatically unresponsive during the child's first two years. To protect themselves from the environment upon which they presumably had no effect, autistic children give up the will to act and retreat into a fortress, leaving reality behind. The world that is given up is not necessarily neglectful and depriving of basic physical needs;

the child is fed and cared for. Rather, it is a world in which the infant does not matter, is not worthy of interaction and influence. Bettelheim points out that child-rearing practices seemingly as innocuous as scheduled feeding can be destructive in that the environment "robs the infant of the conviction that it was his own wail that resulted in filling his stomach" (Bettelheim, 1967, p. 70). He cautions parents, then, to listen and respond to the young child's smallest contribution just as they would to the messages of older and more articulate offspring.

It is not unusual to find that considerable blame for severe behavioral disorder has been placed on parents, particularly on mothers. The terms "refrigerator parents" (i.e., cold, mechanical, unresponding parents) and "schizophrenogenic mother" (i.e., schizophrenia-causing mother) are still all too common in discussions of etiology. Parents of disturbed children, compared with parents of normal children, are frequently tense, domineering, inconsistent, and the like; however, this may be the *result* of having a disturbed child. Several studies (e.g., Connerly, 1967, as cited by Ross, 1974) indicate that parents of brain-damaged and retarded children also exhibit more of these behaviors than do parents of normal youngsters, but it is unlikely that they caused the children's difficulties.

At the present time we can only continue to speculate about etiology and to experimentally and clinically test hypotheses. A multitude of factors—biologically and environmentally based—are undoubtedly involved in producing the wide range of pathology described as psychotic, but their exact nature and role appear unfortunately out of immediate grasp.

PROGNOSIS: WHAT HAPPENS TO THE PSYCHOTIC CHILD?

Kanner (1973) reported that of ninety-six autistic children, only eleven were maintaining themselves when they were in their second and third decades of life. Several of these attained a college education; they were employed, for example, as bank teller, accountant, general office worker, and truck-loading supervisor; they had hobbies; most lived alone; few had romantic relationships and personal friendships, although that appeared not frustrating. In trying to account for the success of the "emergers," Kanner was able to point to only two facts: all eleven had speech before the age of five years, and none had been committed to a state institution.

A later comparison (Lotter, 1974) indicates that for three independent investigations conducted in England and the United States, 62 percent, 61 percent and 74 percent of the disturbed children were judged as having poor or very poor status several years after initial contact (see Table 15-2). They were considered severely handicapped and unable to lead an independent existence, compared with the minority who were leading normal social lives, functioning satisfactorily in school, or making progress in these areas despite significant behavioral abnormalities.

TABLE 15–2
PERCENTAGE OF SEVERELY DISTURBED CHILDREN FALLING INTO DIFFERENT OUTCOME CATEGORIES SEVERAL YEARS AFTER INITIAL CONTACT

OUTCOME STATUS*	MIDDLESEX STUDY	MAUDSLEY STUDY	ILLINOIS STUDY
Good	14	14	10
Fair	24	25	16
Poor	14	13	24
Very poor	48	48	50

*For the Middlesex and Maudsley studies, outcome was assessed eight to nine and one-half years after initial contact, when the child ranged in age from 16 to 18 years. Children in the Illinois study were 12 years old at follow-up, and fewer years had elapsed since initial contact.

Source: Adapted from Lotter, 1974.

Although outcome studies are somewhat difficult to compare because the criteria for outcome status or definition of the original classifications may vary, it is generally agreed that the prognosis for childhood psychoses is poor. Several different treatment approaches exist—emphasizing intrapsychic fixations, education, behavioral intervention, and vitamin intake, among others—but no one treatment seems to ensure a good outcome. Rather, there seems to be a direct relationship with the original severity of the dysfunction—the more severe, the less chance of later normality.

NEUROTIC REACTIONS IN CHILDHOOD

The relatively more mild problems of childhood encompass a wide range of difficulties. Some, like bed-wetting, appear to be sufficiently isolated to be considered categories in themselves. Others, like refusal to go to school, fear of going near harmless dogs, and timidity in interacting with others, may occur quite separately but seem to fall into the more general category of fears and phobias. Still others, like hitting, kicking, biting, and yelling, often appear together and thus can be put into a single descriptive diagnostic category (i.e., aggressive behavior).

How prevalent are such disorders during childhood? Lapouse and Monk (1958) interviewed almost five hundred mothers about their six- to twelve-year-old youngsters and concluded that 43 percent of the children had seven or more fears and worries, 49 percent were overactive, 48 percent lost their tempers twice weekly, 28 percent experienced nightmares, 27 percent bit their nails, and 10–20 percent wet their beds and sucked their thumbs. Many of these figures correspond strikingly with information obtained in later studies in the United States and in Europe (cf. Anthony, 1970). Some general conclusions can be drawn from these investigations:

1. The overall prevalence of these behavior disorders in the general population is quite frequent.
2. Boys exhibit considerably more deviancy than girls.
3. For some problems at least, there is a sex difference. That is, boys display more aggressive behavior, whereas girls show greater anxiety and inhibition.
4. Many of the reported problems seem to disappear spontaneously within a few years.

In interpreting these generalities several points are noteworthy. First, it is not surprising to find that many children exhibit behaviors that are seen in clinics and are thus labeled "problems." Help is sought for children when their functioning appears disturbing to them (i.e., they are "nervous," unhappy, or not achieving in school) or to others (i.e., they are aggressive or disobedient). How quickly any one child will be referred, though, depends upon both the degree of deviancy and the toleration of parents, school authorities, and law agents. Second, the main reason that boys have a higher deviancy rate than girls may be that aggression is usually more easily recognized and less tolerated than are anxiety and inhibition. (Recall, however, that boys also have a higher incidence of learning disability, psychoses, and speech problems.)

Finally, how are we to interpret the fact that many behavior problems spontaneously disappear over time? It seems reasonable to assume that many of them represent transient developmental crises. Children are relatively flexible and are, almost by definition, changing. Care should be taken, then, not to overemphasize the importance of behavior problems. At the same time, treatment may be desirable if the child is experiencing immediate discomfort or is being prevented from reaching his or her potential. Careful analysis of the individual situation is always required.

PROBLEMS ASSOCIATED WITH ELIMINATION

In our culture it is expected that control of the eliminative functions will be achieved during the first few years of life. *Enuresis*, or bedwetting, is usually not considered a clinical problem until the child is at least three years old. Often parents do not report the problem until school age is reached (Millon, 1969).

Enuresis is fairly frequent, occurring in about 15 percent of all children referred to mental health clinics. It is more than twice as frequent among males as among females (Tapia, Jekel, and Domke, 1960; Millon, 1969). The reported incidence declines quite rapidly with age, though; the ratio of enuretics to nonenuretics is 1 to 35 at age fourteen (Lovibond, 1964). Although in part it may be traced to constitutional difficulties, enuresis is most often considered a problem in learning (i.e., the child simply has not learned to awaken before wetting occurs). We shall see later that to a considerable extent it is subject to treatment from this viewpoint.

Encopresis, a much rarer problem, refers to inappropriate defecation. It usually occurs when the child is awake, and frequently alternates with periods of constipation (Millon, 1969). Most studies of encopresis have been simply case reports. In one of the few more extensive investigations (Anthony, 1957), it was found that encopretic children fall into two general classes: those for whom original bowel-training had been successful and then deteriorated, and those who had never been successfully trained. The youngsters in the two groups differed in an interesting way. The former typically had been subjected to quite coercive toilet-training practices from which they were now apparently rebelling, whereas the latter had experienced a generally neglectful upbringing. In both instances, it appears that teaching parents to toilet train (or retrain) their children can alleviate the problem (Barrett, 1969; Conger, 1970).

ANXIETIES AND PHOBIAS

Anxiety is usually thought of as a fairly severe feeling of discomfort, either associated with present or anticipated future circumstances or not directly traceable to any particular situation or event. Closely related to anxieties are phobias—profound and unrealistic fears of particular events, objects, people, or circumstances.

The antecedents of anxiety and phobic reactions appear to be both in specific situations and in characteristics of early upbringing. Trauma was found in one early study (Langford, 1937) to be associated with the first attack of acute anxiety in sixteen out of twenty children who suffered from this type of neurotic reaction. The specific traumatizing experiences included tonsillectomies given under ether, a death in the family, and, in two cases, witnessing violent deaths. Recall also that Watson and Rayner conditioned fear in a young boy by simply pairing a neutral stimulus with noise that already elicited fear (p. 127). Such associations obviously can create new fears. However, traditional (Freudian) views of abnormal behavior link phobic or avoidant reactions with an underlying feeling of anxiety caused by psychological conflict that is unrecognized by the individual.

Common fears in childhood

In a classic study, Jersild and Holmes (1935) disclosed a number of fears common to childhood, revealing that some of them (e.g., of noise, strangers, and unexpected movements) decreased during the first six years of life, while others actually increased over the same period. In the latter group were fears of dreams, animals, and threats of danger. Some of these patterns are shown in Figure 15–1. It should be noted, though, that many common fears of childhood do not reach highly serious levels and that almost all of those shown in the figure show a decline by later childhood or the early teen years.

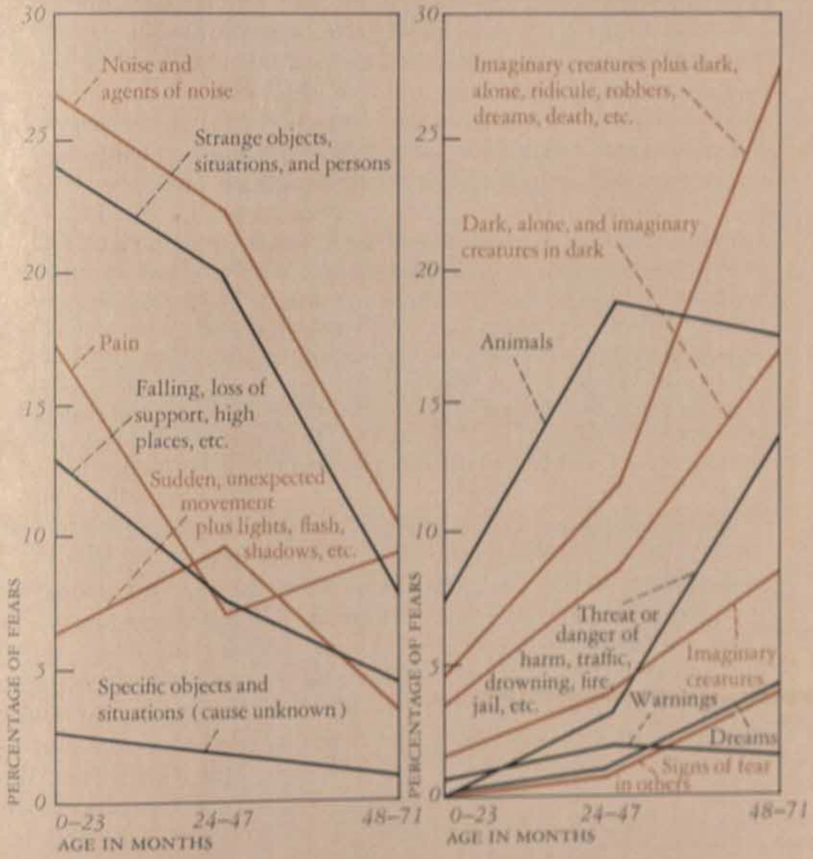

FIGURE 15-1
Relative frequency of fears in children during the first six years of life, as observed by parents or teachers or reported by the youngsters themselves. Adapted from A. T. Jersild and F. B. Holmes, Children's fears. *Child Development Monograph*, 1935, No. 20. Teachers College, Columbia University Bureau of Publications, by permission.

School phobias Few types of neurotic disorders in childhood have been studied more extensively than school phobia. The school phobic child is one who refuses to go to, or to remain in, school, although truancy and delinquency in the usual sense are not present. The problem is serious because in our society school is considered "the work of the child," and because nonattendance cuts off social relationships as well as formal learning experiences.

It is generally recognized that this behavior may be directly related to school circumstances that are extremely fear- or anxiety-provoking for the child. But in many cases the problem can be conceptualized as an unwillingness to leave the parents, thereby relating it to earlier forms of attachment to one's mother. In fact, there is reason to believe that overprotection by parents is associated with the development of such phobic reactions. Eisenberg (1958) has argued that school phobic children and their mothers simply have developed a mutually dependent relationship in which separation is difficult or disturbing. To the extent that this is the case, school merely represents the first occasion that demands separation. Eisenberg supported this contention through his study of eleven preschool children (six boys and five girls) with separation problems. Observation of the mothers and their offspring at the beginning of nursery school attendance showed that the mother made at least as much contribution as the child to the separation problem.

> During the first days a typical child would remain close to mother and then begin to oscillate toward and away from the attractions of the play area. As the child began to look less at mother and move away from her, she would take a seat closer to the child and occasionally use a pretext of wiping his nose or checking his toilet needs for intruding into the child's activity. Separation was as difficult for mother as for the child. Similar resistance to separation was shown by the mother when she was required to move to an adjacent room as part of the program for reducing the mutual separation anxiety. [Hetherington and Martin, 1972, p. 59]

PSYCHOSOMATIC DISORDERS

Psychosomatic disorders are real physical illnesses that are either caused by or markedly influenced by psychological factors. A variety of such difficulties are known to occur in childhood: asthma, rheumatoid arthritis, ulcerative colitis, and peptic ulcers (Hetherington and Martin, 1972). The interactions between parents and children suffering from these disorders have been found to differ rather markedly from the interactions that characterize parent-child pairs in which the youngster suffers from a physical illness not based on psychological factors (such as congenital heart disease or polio). In one study (Garner and Wenar, 1959) it was found that youngsters with psychosomatic disorders typically have a relationship with their mothers in which there is little personal closeness; rather, the mothers tend to be easily irritated and angered, and the children themselves also are rated as high on anger. There is, further, a keen sense of competition between the mother and the child, with an effort by the parent to exert a good deal of domination. Just as this pattern distinguishes children who are psychosomatically troubled from those who are only physically ill, it also distinguishes the former group from youngsters who are psychotic. The severely psychotic child's mother does not try to dominate or compete; rather, she is rated high on "obliviousness," often seeming to be insensitive to the child and impervious to the consequences of bizarre behavior (Wenar, Handlon, and Garner, 1960).

Asthma

The physical basis for asthmatic attack is constriction of the bronchial ducts which supply air to the lungs, resulting in difficulty in breathing and a wheezing sound when the victim exhales. More than half of all asthmatic children seem to suffer from clear-cut physical difficulty, such as whooping cough, bronchitis, pneumonia, or specific allergies (Rees, 1964). The remaining cases, though, appear to be based on either psychological factors or a mixture of psychological and physical ones. Evidence suggesting the importance of family patterns in the etiology of psychologically induced asthma is found in the fact that some asthmatic children improve markedly when removed from their homes and placed in hospitals (e.g., Long, Lamont, Whipple, Bandler, Blom, Burgin, and Jessner, 1958; Purcell, Brady, Chai, Muser, Molk, Gorden, and Means, 1969). Because one possible reason for this dramatic change is the elimination of particular kinds of dust and other potential allergens in their own households, Long and his associates (1958) controlled for this factor by spraying the hospital rooms of their subjects with dust from their respective homes. Despite the fact that many of these children had previously shown skin sensitivity to house dust, none of them developed asthmatic symptoms in the hospital as a result of exposure to the dust. Other investigations (e.g., Gerard, 1946; Mohr, Taus, Selesnick, and Augerbraun, 1963) have suggested that one specific family pattern associated with psychosomatic asthma is overprotectiveness on the part of the child's mother.

EXCESSIVE AGGRESSION

Aggression toward others, if excessive, is one type of behavior that may be a problem in childhood. It is impossible, of course, to describe its frequency clinically, inasmuch as a host of social factors determines whether any one response or any one child will be considered too aggressive. But a great deal is known about the antecedents of aggression. As we saw earlier (Chapter 11), aggressive behavior is fostered by direct reward and exposure to live and symbolic aggressive models, but it can be reduced dramatically when positive consequences are curtailed.

A particularly dramatic example of this latter point is found in a study by Patterson, Littman, and Bricker (1967). They observed thirty-six nursery school children for nine months, noting the occurrence and consequences of more than twenty-five hundred aggressive responses among the youngsters. Their findings, consistent with a learning approach, were straightforward: when an aggressive response was successful (for example, when the victim gave in to the antagonist's demand), the same aggressive response would usually be repeated against the same victim on a subsequent occasion. In sharp contrast, if retaliation followed such a response, the aggressor would usually take another approach in the future or select a different victim.

TREATMENT OF CHILDHOOD DISORDERS

Today there is much concern about children with behavior problems, but this is relatively new. Indeed, it appears that the term *emotional disturbances* was not applied to children until 1932 (Despert, 1965); before then youngsters exhibiting troubled behavior were thought of in terms of moralistic labels such as *possessed, wicked, guilty, insubordinate, incorrigible*. Such views naturally determined the kind of treatment children with behavior problems received. In ancient Greece and Rome they might be left to die; in nineteenth-century London they were imprisoned (O'Leary and O'Leary, 1972).

In the 1930s this began to change. The psychiatric movement, largely inspired by the writings of Freud, gave rise to the appearance of a number of child psychiatric clinics that provided treatment based on traditional psychoanalytic and counseling view of psychotherapy.

EFFECTIVENESS OF TRADITIONAL THERAPY

In 1952 Hans J. Eysenck, a British psychologist and researcher, published an article entitled "The Effects of Psychotherapy: An Evaluation." Dealing with the question of whether various types of traditional psychological treatments were actually helpful in treating adult psychological disorders, Eysenck asked about the rate of improvement among those who received treatment. At first blush, the results seemed reasonably promising; approximately two-thirds of those who received treatment showed measurable improvement. However, it is possible, as Eysenck realized, that improvement might occur even if there had been no therapy; a variety of natural experiences in a person's life and the transient nature of certain types of psychological disorders might conspire to produce improvement in some cases. So Eysenck made a comparable study of persons who sought or apparently needed psychotherapy but were unable to receive it. Strikingly, he found that among this group, too, approximately two-thirds showed improvement—despite their receiving no formal therapy whatsoever. It is not surprising, then, that the Eysenck paper stirred a great deal of controversy.

Five years later E. E. Levitt conducted a similar analysis assessing the effects of traditional psychotherapy with children. Examining results of seventeen different studies involving thousands of youngsters, Levitt stated:

> . . . the results, and the conclusions of this paper are markedly similar to those of Eysenck's study. Two-thirds of the patients examined at close of therapy and about three-quarters seen in follow-up have improved. *Approximately the same percentage of improvements are found for comparable groups of untreated children.* [1957, p. 194, italics added]

The findings described above are quite reliable; Levitt reported a further analysis of twenty-two other "outcome" studies of psychotherapy with children, abstracting his new findings this way: "It must still be concluded that there does not seem to be a sound basis for the contention that psychotherapy facilitates recovery from emotional illness in children" (Levitt, 1963, p. 45). And the pattern has continued. For example, a two-year follow-up of children with a variety of disturbances revealed that 63 percent of those who had been seen in a clinic improved, but so had 61 percent of matched control children who had not been seen in a clinic at all (Shepherd, Oppenheim, and Mitchell, 1966).

Partially as a result of these reports, there have been attempts to broaden the types of approaches to treatment. Some of them are tied closely to theoretical stances, while others appear to be more simply pragmatic. The following discussion touches upon four different approaches, including the traditional Freudian view, which, despite criticism, is still adhered to by a number of therapists and counselors.

PSYCHOANALYTIC TREATMENT

Freudian theory postulates that behavioral problems are symptoms of underlying conflict among instinctual demands (id), conscious thoughtful regulation (ego), and self-evaluative thoughts (superego). The conflict is postulated to be unconscious, and treatment is designed to bring it into consciousness, resulting in resolution of the conflict and relief of the symptoms. Therapy focuses on the patient's free verbal associations, dream interpretation, the patient-therapist relationship, and "working through" the conflict.

The application of Freudian theory to the treatment of childhood disorders can be traced to the therapy of Little Hans that was conducted by Hans's father under Freud's supervision. Five-year-old Hans was reported to have an unexplainable and irrational fear of horses, severe enough to prevent his going into the streets. Freud postulated the existence of an underlying oedipal complex; that is, that Hans unconsciously desired his mother and felt simultaneous hate, love, and fear toward his father. The fear, however, was projected onto horses, the animals' muzzles and blinders being symbolic representations of the father's mustache and eyeglasses. Treatment consisted of the father interpreting Hans's remarks so as to gradually bring the underlying conflict into consciousness:

> On April 25, 1908, Hans, who had just reached the age of five, was answering some of his father's questions. In a climate of confidence and acceptance, he admitted that he would like to see him dead and marry his mother. This was the culminating point of the therapeutic process, and from that time on, the remnants of the phobia gradually receded; the Oedipus complex had been overcome. [Cited by Ellenberger, 1970, p. 509]

Treatment of children by analytic methods has been carried on extensively by Freud's daughter, Anna, who views its purpose as the liberation of development that has become inhibited or deviant by previous emotional fixations. Consistent with the basic theory, this is accomplished by explorations of inner conflicts, particularly those that are unconscious. But Anna Freud has emphasized that treating children is critically different from treating adults (A. Freud, 1946). One of the major differences is that children do not themselves seek therapy and are not prepared for it. The therapist must therefore take the responsibility of preparing the child by, for example, encouraging insight that a problem exists and establishing a strong child-therapist relationship. A second important difference is that children do not easily enter into free association about their inner lives. Other ways must be found, then, to uncover conflict, such as observing the child at free play, examining the child-parent relationship, and studying the child-therapist relationship. Finally, the therapist must educate the parents as to the child's problems while directly guiding the child in conducting his or her instinctual life. The latter involves determining "what part of the infantile sexual impulses must be suppressed or rejected as unemployable in the cultural world; how much or how little can be allowed gratification" (A. Freud, 1946, p. 45). Such direct guidance and work with parents is not characteristic of several other therapists who nevertheless follow Freudian theory. It is interesting to note that Anna Freud's use of the play setting to diagnose problems differs from that of many analytic therapists in that she does not symbolically interpret the child's actions. For example, while others may interpret the child's throwing a doll across the room as a sign of hatred for the mother, Freud is more likely to view it as a direct expression of anger related to the situation.

NONDIRECTIVE PLAY THERAPY

Nondirective play therapy has its basis in the humanistic view of development. Virginia Axline, its foremost proponent, describes the assumptions of the method in this way:

> There seems to be a powerful force within each individual which strives continuously for complete self-realization. This force may be characterized as a drive toward maturity, independence, and self-direction. It goes on relentlessly to achieve consummation, but it needs good "growing ground" to develop a well-balanced structure. Just as a plant needs sun and rain and good rich earth in order to attain its maximum growth, so the individual needs the permissiveness to be himself, the complete acceptance of himself—by himself, as well as by others—and the right to be an individual . . . [1947, p. 10]

Axline points out that when the individual is prevented from achieving complete realization of the self, tension, friction, and resistance occur. Drive for self-realization continues, however, resulting in either an outward fight to establish a self-concept or a struggle confined to an inner world. It is the latter development, manifested by withdrawal, daydreaming, repression, and regression, that is maladjusted behavior. The aim of nondirective therapy is to permit the individual to be himself or herself and to begin to realize the power to think, decide, and mature.

This goal is reached within the context of free play, the child's most natural medium of expression. Play is not used, though, for diagnosis, as it is by Anna Freud, nor is it interpreted symbolically. Rather, it is the background in which the child is allowed to be himself or herself by expressing the insecurity, fear, confusion, aggression, and tension being experienced. Axline provides eight guidelines for conducting therapy:

1. The therapist must develop a warm, friendly relationship with the child.
2. The therapist accepts the child exactly as he or she is.
3. The therapist establishes a feeling of permissiveness in the relationship so that the child feels free to express himself or herself.
4. The therapist is alert to recognize the feelings of the child and reflect them back, thereby fostering the child's insight into his or her behavior.
5. The therapist maintains a deep respect for the child's ability to solve problems.
6. The child leads the way; the therapist follows.
7. The therapist does not attempt to hurry the therapy along.
8. The therapist establishes only those limitations that are necessary to anchor the therapy to the world of reality and to make the child aware of his or her responsibility in the relationship. [1947, pp. 73–74]

Children's response to this therapeutic experience, according to Axline, is captured by one seven-year-old boy spontaneously crying out, "Oh, every child just once in his life should have a chance to spill out all over without a 'Don't you dare! Don't you dare! Don't you dare!'" and an eight-year-old girl exclaiming, "In here I turn myself inside out and give myself a shake, shake, shake, and finally I get glad all over that I am me."

THE PSYCHOEDUCATIONAL APPROACH: PROJECT RE-ED

Project Re-ED is a treatment approach for helping children so seriously disturbed that they cannot remain in a regular school setting. The objectives of the program are to provide a total "re-education" (both academically and socially) in a brief, high-impact, residential program that is feasible economically for most families and communities. Re-ED has taken an educational approach, using specially trained teachers instead of therapists, who work with the children twenty-four hours a day for approximately six months.

To meet the needs of the school approach, a new professional was created: the teacher-counselor. Recruited from the ranks of effective classroom teachers, they were carefully chosen for the special qualities that are needed for the many roles they assume at Re-ED—that of teacher, mental health professional, recreational leader, professional counselor, and parent substitute.

Two teacher-counselors (TCs) and a liaison teacher are assigned to each group of eight children. Together they set specific individual goals, plan programs, and evaluate each child's progress. The TCs live, work, and sleep with the children; responsibilities are divided between them. One TC concentrates on the in-school teaching aspects of the program, providing needed academic skills; the other handles the counseling, recreational, and group functions that help children acquire social and personal skills such as learning how to kick a football or how to share with others. An important strength of the program is that nonschool hours are supervised by a sensitive and competent person. This makes it possible to meet the Re-ED goal of constructively using all hours of the day to facilitate both learning and emotional adjustment.

The liaison-teacher's job is to find a "better fit" between the child and his or her environment. The liaison makes contact with the home and school before the child's enrollment, maintains contact while the child is in the program, and plans optimal conditions for the child's return. He or she also monitors the child's home weekend visits. Then, after the child returns to the family, the liaison serves as a consultant to both the parents and the classroom teacher, suggesting techniques to cope with any problems. The liaison may, for example, try to alter parental expectations, teach them behavior management, or arrange to hire a tutor.

Justification for the Re-ED program can be found at several levels. First, the need for such services is great. Nicholas Hobbs (1966), the project's innovator and director, points out that there are approximately 1.5 million children with emotional problems sufficiently profound to prevent their functioning adequately in normal family or school settings. Second, the cost is relatively low: the Re-ED per-day cost is about one-third of inpatient psychiatric care in a state facility. Most important, though, is that Re-ED seems to work.

An extensive evaluation was part of the original design of the Re-ED project (Weinstein, 1969, 1971). Based on data collected on each child prior to enrollment, at discharge, and again at six and eighteen months after discharge, Re-ED has been shown to produce a substantial and durable gain; all Re-ED children were in regular schools eighteen months after discharge and only one had a "special class" placement. A matched control group of disturbed children who remained in regular schools showed no improvement and, in fact, became somewhat worse over the six-month period. Because these results convincingly show that improvement in Re-ED children was not due simply to the passage of time, it is not surprising that the program is now a model for special school facilities in several states.

BEHAVIOR MODIFICATION

Of all the innovative approaches that have appeared since Levitt's review of the inefficacy of traditional approaches to children's behavior problems, perhaps none is more widely talked about than the behavior modification programs.

Within this model, maladaptive behaviors are considered learned ways of dealing with the world that are in themselves the problems. They are not viewed as symptoms of some underlying conflict. The focus of therapy is thus very directly on the behavior itself. Critics of behavior modification argue that an approach that ignores deep inner causes will not be effective in the long run because new symptoms of the underlying problem will appear. Investigations into this possibility have been carried out by a number of researchers, many of whom are behavior modifiers. In general, they show that new symptoms do *not* occur (e.g., Eysenck, 1960; Lazarus, 1963; Wolpe, 1958). Compellingly, the same conclusion has been reached by Weitzman (1967), a psychoanalytically oriented therapist.

At the technique level, behavior modification approaches are characterized by direct observation, systematic manipulation, and repeated assessment (cf. Levitt, 1970).

Direct observation Many types of therapy rely on tests of personality or adjustment, or on projective tests to assess the difficulties of individuals seeking help. The behavior modification approach to assessment is quite different, as a result of the assumption that specific learning contingencies rather than more general personality problems underlie abnormal behavior. Even when particular behavior patterns occur together, as in the case of autism, the specifics are presumed to be critical information for the therapist to begin treatment. Thus there is considerable reliance on direct observation, and, as necessary, quite individualized assessment of the actual behavior of each youngster for whom treatment is suggested or requested. As Levitt explains:

> Behavior modifiers agree that before a behavior can be measured, much less changed, it must be directly recorded. If, for example, the target behavior is tantrums, the outbursts are recorded directly; an indirect approach such as an interview or a standardized adjustment test is not scheduled. If the target behavior is reading, direct measurement on various reading components would be obtained instead of using a standardized reading or achievement test to determine skills. [1970, pp. 87–88]

Systematic manipulation In part it is obvious that a child's behavior can be altered successfully only if something is done with (or to) him or her: in this sense, of course, manipulation is involved in all types of therapy. We have seen, though, that in traditional therapies intervention is nondirective or global. The behavior modification approach, in contrast, is characterized by a very specific, detailed, and systematic plan for intervention, generally with an eye to altering particular consequences for behaving in certain ways.

Repeated assessment Behavior modification is almost uniquely pragmatic in that a manipulation is tried and an immediate effort is made to determine whether the desired changes are occurring. If not, the plan will be changed; that is, a different manipulation will be introduced, and then it too will be evaluated. Thus, repeated assessment, based on regular direct evaluation, is typical of the approach.

EXTENDED DISCUSSION

APPLICATION OF BEHAVIOR MODIFICATION

The general principles of behavior modification, outlined above, are usually applied within the framework of one or more of the basic learning paradigms. A more concrete understanding of how the approach works can be obtained through actual examples and cases.

A CLASSICAL CONDITIONING APPROACH TO ENURESIS

Earlier it was pointed out that the difficulty of enuretic children, viewed in learning terms, is that they have not learned to awaken before bed-wetting occurs. Presumably this is because internal stimulation (i.e., bladder tension) does not arouse them from sleep. Many years ago Mowrer and Mowrer (1938) related the problem to classical conditioning. They reasoned that the desired response could be produced by pairing the ringing of a fairly loud bell (a UCS, or unconditioned stimulus, which would inevitably awaken the child) with bladder stimulation (the CS, or conditioned stimulus). Waking up—an unconditioned response (UCR) to the bell—should then become a conditioned response to the bladder tension alone; permitting the child to reach the toilet in time.

The Mowrers attempted to treat enuretic youngsters accordingly. The children slept on a specially prepared pad made of two pieces of bronze screening separated by a heavy layer of cotton. When urination occurred it invariably would seep through the fabric, close an electrical circuit, and cause the bell to ring. After repeated pairings, bladder tension alone would be expected to waken the child. Thirty children were treated by the Mowrers in this way, for a maximum period of two months, and bed-wetting was successfully eliminated in every case. Additionally:

> Personality changes, when they occurred . . . have uniformly been in a favorable direction. In no case has there been any evidence of "symptom substitution." Our results, therefore, do not support the assumption, sometimes made, that any attempt to deal directly with the problem of enuresis will necessarily result in the child's developing "something worse." [Mowrer and Mowrer, 1938, p. 451]

The apparatus devised by the Mowrers has been used successfully ever since. It is now available commercially from a number of stores and mail-order houses and is widely prescribed in the treatment of enuresis.

Operant conditioning/modeling applied to seriously disturbed behavior A combination of operant conditioning and modeling procedures has been applied to extreme behavioral deficiencies in children. Notable in this area is the work of O. Ivar Lovaas and his associates (Lovaas, 1968; Stevens-Long and Lovaas, 1974) with autistic children: self-destructive action is reduced by isolating the children, echolalic speech is similarly decreased by nonattention, and normal speech is gradually shaped by food rewards for the imitation of the experimenter's verbalizations (see Figure 15–2). Realizing that social reinforcement is typically the cornerstone for building and modifying behavior in the natural environment and that autistic children appear unresponsive to such reinforcement, Lovaas and his associates make a concerted effort to establish the importance of social rewards by pairing them with tangible ones (Lovaas, 1968). For example, when food reinforcement is presented for a particular act, it is paired with the word "good." Later, praise alone may become a reinforcer. (For a discussion of the ethical and practical considerations in the use of tangible rewards in treating behavioral problems, see O'Leary, Poulos, and Devine, 1972.)

A study by Wiltz and Gordon (1974) illustrates both the use of operant conditioning in behavior modification and the training of parents to deal effectively with their troubled offspring. The child was a nine-year-old boy who had been diagnosed schizophrenic. He refused to attend school and displayed many problem behaviors: lighting matches, taking money from his mother's purse, locking himself in the bathroom, throwing fruit against the wall, and urinating on toilet facilities and the wall. He had spent time in a juvenile detention facility, and his parents were considering returning him because of their failure to manage him in any way.

The investigators thus prepared to train the parents to deal with the child, and they were able to use an innovative method to do so. The entire family, including all the children, moved into a special three-bedroom apartment for five days; one-way mirrors and microphones permitted the investigators to observe the family in the kitchen, living room, and one bedroom. Observations took place continuously from 10:00 A.M. to 7:00 P.M., during which time the mother and children were present continuously and the father was present for the last three hours.

Treatment focused on compliance with commands given by the mother and general appropriate behavior. For several days before the family moved into the treatment residence, and the first two days afterward, a baseline of the boy's behavior was obtained. The parents recorded commands, noncompliance, and destructive acts toward people and property. On the second day of treatment, the parents also completed a programmed text designed to inform them about management of children with behavior modification techniques.

The third day was devoted to training itself. A reinforcement schedule was put into effect whereby the child earned points for a desired toy based upon his compliance with his mother's commands and generally appropriate behavior. A variable interval schedule was employed, in which reinforcement occurred once during a certain time interval; as

FIGURE 15-2
The use of positive reinforcement—food and praise—by Lovaas and his associates in the shaping of appropriate social behavior in autistic children. Photograph by Allan Grant, by permission.

the program progressed, the time interval was lengthened and verbal reinforcement was substituted for the points. Thus the child was expected to act in a progressively more acceptable way for less tangible reward. Punishment was also used; whenever the child failed to comply with parental instructions, he was placed on time-out in his bedroom. For each disruption during time-out, additional minutes were added. All of the procedures were modeled by the researchers and rehearsed step by step with the mother and child. Upon returning to the apartment in the late afternoon, the father was brought into the program.

The final two days of treatment consisted of observations of the implementation of the method, feedback to the participants, and modification of the reinforcement contingencies as just described. The program was continued at home by the family, with telephone supervision from the researchers.

The success of the therapy is evidenced in Figure 15–3, which shows decreases in both noncompliance to parental demands and destructive acts toward other people from the time of pretraining to approximately three weeks after training.

The training of parents to manage their offspring is frequently an important aspect of behavior modification. This study is of particular interest, however, in that it demonstrates the feasibility and advantages of a resident training unit. The effort expended by the family enabled it to obtain intensive therapy over five days, which resulted in rapid beneficial changes at a time when institutionalization was being seriously considered.

A modeling approach to extreme isolation

Recent behavior modification approaches to children's problems have increasingly used techniques based on observational or imitative learning. One of the great advantages of this approach lies in its potential for group treatment. If children can learn new forms of desirable behavior merely from watching appropriate examples, then mass media such as films and television programs potentially may become a tool for the child psychotherapist. Several studies have now shown that this rather ambitious tactic can work. Children's fears of dogs have been reduced markedly by exposure to appropriate modeling films (e.g., Bandura and Menlove, 1968; Hill, Liebert, and Mott, 1968), as has the fear of receiving dental treatment (Adelson, Liebert, Herskovitz, and Poulos, 1972). A typical viewing situation is shown in Figure 15–4.

FIGURE 15–3

Rate of (a) noncompliance and (b) destructive acts toward others, before, during, and after the training procedures. Adapted from Wiltz and Gordon, 1974.

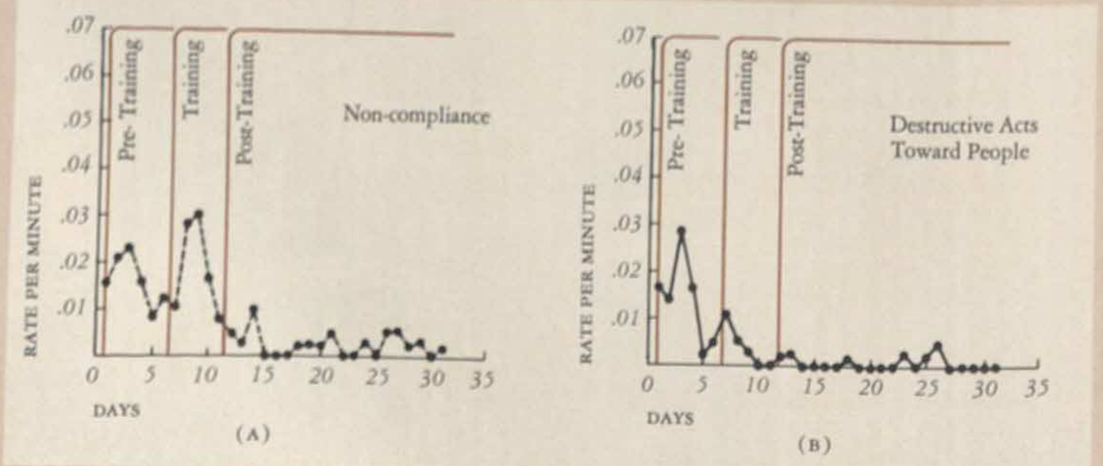

FIGURE 15–4
A child viewing the film produced by Hill, Liebert, and Mott (1968) to reduce children's fear of dogs.

Here we shall consider treatment of a somewhat different problem. Interested in extreme forms of social isolation among nursery school children, O'Connor (1969) selected thirteen children who almost never engaged in social interaction with their peers. These children, observed initially by both their teachers and other highly trained individuals, differed very sharply from an arbitrarily selected group of "normal" children in the same situation. Six of the youngsters were then assigned to a modeling treatment condition while the remainder served as controls.

The carefully designed modeling treatment was deceptively simple. The children saw a film, presented to them on a large television console:

> The film portrayed a sequence of 11 scenes in which children interacted in a nursery school setting. In each of these episodes, a child is shown first observing the interaction of others and then joining in the social activities, with reinforcing consequences ensuing. The other children, for example, offer him play material, talk to him, smile and generally respond in a positive manner to his advances in the activity. The scenes were graduated on a dimension of threat in terms of the vigor of the social activity and the size of the group. The initial scenes involve very calm activities such as sharing a book or toy while two children are seated at a table. In the terminal scenes, as many as six children are shown gleefully tossing play equipment around the room. [O'Connor, 1969, p. 18]

Children in the control group saw a television film about dolphins that was not designed to teach social interaction.

The effects of one treatment session upon the previously isolated children were dramatic; they were now willing and able to engage in as many (or more) appropriate social interactions as were children not isolated in the first place (see Figure 15–5 posttest). A follow-up at the end of the school year revealed that all but one of the children in the modeling condition had continued their new habits of social interaction;* control children, on the other hand, tended still to be rated as extreme isolates by their teachers.

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*And this one child, O'Connor points out, saw the film with an unsynchronized sound track, as a result of a mechanical failure.

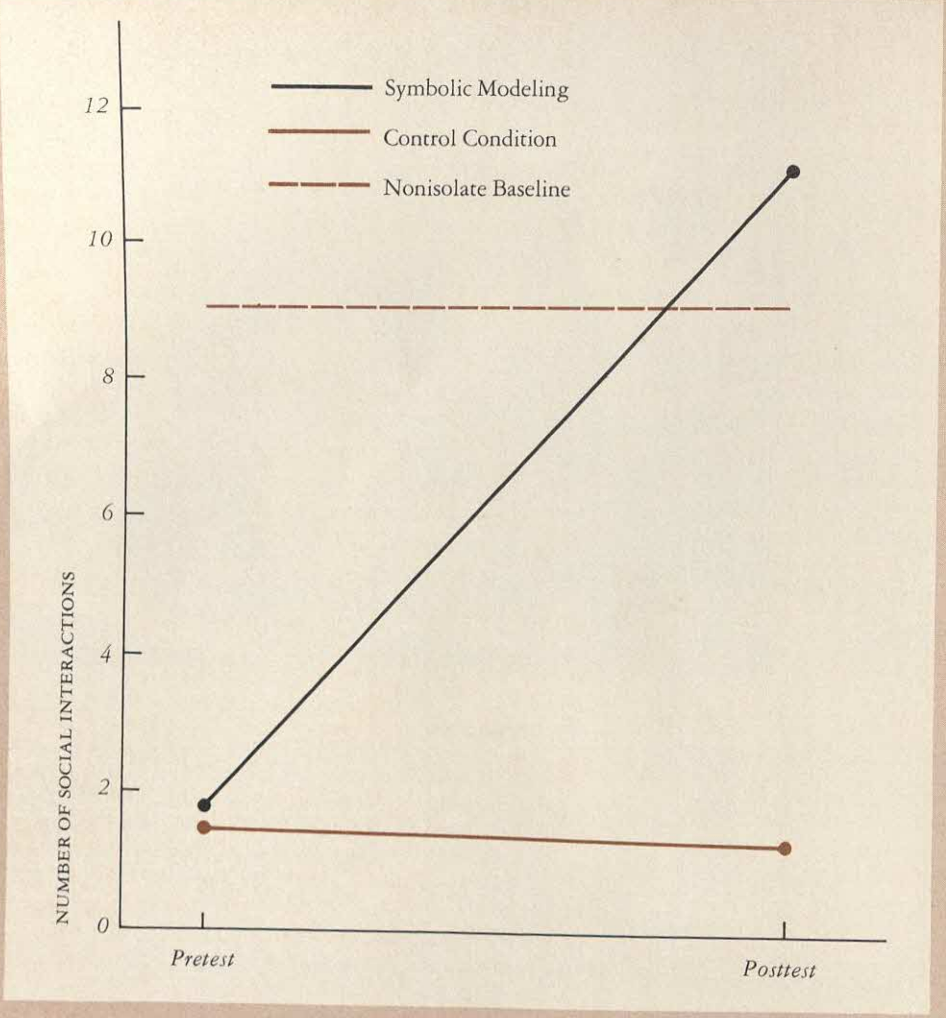


FIGURE 15-5
Mean number of social interactions displayed by children in the modeling and control conditions, before and after the experimental sessions. The broken line represents the level of interactions manifested by 26 nonisolate children who were observed at the pretest phase of the study. Adapted from R. D. O'Connor, Modification of social withdrawal through symbolic modeling. *Journal of Applied Behavior Analysis*, 1969, 2, by permission.

In a similar subsequent study, O'Connor (1972) compared the effects of the control film, the modeling film, a shaping procedure, and a combination of the modeling film and the shaping procedure. Shaping consisted of children's receiving praise and attention during a two-week period whenever they demonstrated approximations of social interaction. In the posttest, all three treatments increased social interaction. However, a three-week follow-up assessment revealed that improvement from shaping did not hold up, whereas the effect of the modeling film did, whether it was presented alone or with shaping. We know, of course, that praise and attention can affect children in many situations, and, as O'Connor notes, the differential influences of shaping and modeling remain to be explained.

CHILDHOOD BEHAVIOR AND LATER PROBLEMS

One question regarding childhood disorders that has been of continued general interest is whether or not the appearance of abnormalcy or problem behavior in later years can be predicted from its presence during the earlier years of life. Obviously, the issue is not only of theoretical importance; it also has practical implications for the treatment of children displaying some sort of psychological dysfunction. If behavior disorders merely disappear or are markedly reduced by the time adulthood is reached, they would be of less concern than if they were highly predictive of later problems. What, then, is known about this issue?

To begin with, it seems there has been a tendency to overinterpret the importance of certain childhood problems. The point is well illustrated by examining one of what Anthony (1970) has referred to as the "fashionable trends" which have sometimes been involved in defining *abnormal*.

One such trend has been traced by Kanner (1960), following the history of the meaning attributed to children's nail-biting over a twenty-five-year period:

> In 1908, nail biting was regarded as a "stigma of degeneration"; in 1912 it was seen as "an exquisite psychopathic symptom"; in 1931 it was described as "a sign of an unresolved Oedipus complex." Following this, a survey indicated that 66% of school children had been nail-biters at some time or another, which led Kanner to remark that it was "hardly realistic to assume that two-thirds of our youth are degenerate, exquisitely psychopathic or walking around with an unresolved Oedipus complex." [Anthony, 1970, p. 668, citing Kanner, 1960, p. 18]

For the most part, children who display annoying behaviors such as nail-biting, nose-picking, "nervousness," and masturbation grow up to be well-adjusted and productive adults. Fears, irritability, and "nervousness" in childhood fail to predict most adult disorders, and minor sexual deviations in childhood do not relate to deviant adult sex behavior (Robins, 1966). Furthermore, children judged to be shy, withdrawn, or inhibited are no more likely to become neurotic later than are their matched controls (Kohlberg, La Crosse, and Ricks, 1972; Robins, 1966). In fact, Kohlberg and his associates have noted that youngsters brought to guidance clinics for emotional problems without accompanying antisocial behavior or other complications are likely to be almost as well adjusted when they reach adulthood, as those from a random sample of the population.

Years ago Wickman (1928) compared teachers' and clinicians' views of maladaptive behavior among children. The teachers, he found, viewed hyperaggressive and similar antisocial behavior as considerably "sicker" than social withdrawal and shyness; the clinicians took the opposite view. Through the past few decades the "mental health view" that withdrawal is the more serious psychological problem has been promulgated widely, even though, as we have seen, it does not predict later difficulties. What, then, about antisocial and aggressive behavior?

In a major longitudinal study, Robins (1966) followed more than five hundred children, seen in a guidance clinic in the 1920s and 1930s, into adulthood. The results were clear: antisocial behavior in childhood—physical aggression, truancy, vandalism, theft, illicit sexual activity—was by far the best early behavior predictor of later problems. Fully 37 percent of those with serious episodes of antisocial behavior during childhood became sociopathic adults—i.e., they repeatedly failed to conform to social norms in many areas of life, whereas *no* child without this history was later judged sociopathic. Youngsters with an early history of antisocial behavior were also two-and-a-half times more likely than controls to have an adult criminal record. Nor is the predictiveness of early antisocial behavior limited to criminality. Antisocial children were 50 percent more likely than controls to be mentally ill adults, and also more likely to become psychotics or alcoholics. Even more impressive, the frequency of antisocial symptoms in childhood bears an almost linear relationship to later difficulties. A child had a 15 percent chance of being a well adult if he had six antisocial symptoms and only a 5 percent chance of being well if he had ten or more. The predictability of adult maladjustment from antisocial behavior in childhood has been confirmed further by Field (1969).

Closely related to antisocial behavior as reported by parents and teachers is the occurrence of early problems in peer relations. Children who "broke down" as adults were, as youngsters, more disturbing to their peers than those who did not. This difference, Kohlberg and his associates have pointed out, "occurred in spite of rigorous matching for age, IQ, sex, social class, and childhood rearing conditions" (1972, p. 1257).

Although the investigations summarized above provide valuable information, they are limited in several ways because they are *retrospective*, or *follow-back*, studies. The method involves the identification of adults who do or do not exhibit deviant or problem behavior, and then the examination of their past through official records made at the time or interviews with parents, friends, and the like, asking them to recall the past. Such follow-back data, however, frequently may not be reliable. Parents, for example, may not accurately recall the behavior that their children displayed years before, may not have been aware of the relevant feelings of their offspring, and may deliberately bias their reports out of shame or embarrassment (cf. Garmezy, 1974a; Yarrow, Campbell, and Burton, 1970). Furthermore, some kinds of potentially enlightening information may not be available or reconstructible, such as the individual's childhood performance on a reaction-time test or attitude scale. Because of these shortcomings, some investigators have recently turned to *prospective,* or *follow-up,* research, particularly in the hope of finding information about the determinants of severe behavioral disorders. Such investigations are known as vulnerability, or high-risk, studies.

VULNERABILITY RESEARCH

The vulnerability research method involves the selection of children who, based on present knowledge, are more vulnerable to *later* severe psychopathology than is the typical child. These youngsters, who are said to be at *high risk,* are subsequently compared with low-risk children on variables that the investigator believes relevant to the development of the disorder. Many of the studies are longitudinal and trace individuals over several years, identifying those who actually "break down." By examining the data collected throughout the years, the investigator can thus determine differences between these individuals, high-risk individuals who did not break down, and low-risk individuals.

High-risk children can be chosen on several bases, such as their exhibiting some mild disturbance and belonging to a disturbed family or their belonging to low SES (Garmezy, 1971). However, the most common basis is that they have at least one parent who has been diagnosed as schizophrenic. The rationale for this procedure is that, according to most estimates, children of such a parent have a 12 to 14 percent chance of receiving the same diagnosis in their lifetime, compared with a 1 percent chance for the population at large. The investigator thus maximizes the chance of including at least some small number of potentially severely disturbed individuals in the costly and difficult research program. (Caution is necessary, though, in interpreting these figures. Despite the increased probability of later difficulty, most high-risk children will *not* be considered schizophrenic in their lifetime.)

Recognition of the advantages of high-risk research is due largely to Sarnoff A. Mednick and Fini Schulsinger, who undertook the first extensive study of its kind in the early 1960s in Denmark. They selected 207 normally functioning adolescents, each of whom had a schizophrenic parent, and matched them with low-risk children on age, sex, residence, and the like. Information about the birth of the subjects was obtained from the midwives present at birth, and reports of academic and social performance were provided by teachers. In addition, each subject was given several psychological tests, including an intelligence test, and a word association test. Finally, the subjects were exposed to a classical conditioning task in which a neutral tone (CS) was paired with an aversive noise (UCS), and subsequent tests of generalization to other neutral tones were conducted. During these trials heart rate and galvanic skin responses (GSR) were recorded to evaluate the reactivity of the autonomic nervous system.

The results of the initial measurement showed that high-risk individuals compared with the low-risk controls had longer and more difficult births, greater conflict in their homes, somewhat lower intelligence test scores, more deviant behavior in school, more idiosyncratic and fragmented responses on the word association test, and more reactive autonomic responses to unpleasant noise.

In 1968 it was reported that twenty of the high-risk individuals had suffered some behavioral difficulty, twelve actually being hospitalized for psychiatric disorders and eight being diagnosed as schizoid, alcoholic, or delinquent (Mednick and Schulsinger, 1968). The investigators compared these "sick" subjects with matched high-risk subjects who had remained "well." They concluded that breakdown was associated with

1. Early loss of mothers to institutions, which can be interpreted as the "sick" individuals' having more severely disturbed mothers, or experiencing greater stress, or both.
2. Disordered associations, indicated by the "sick" individuals' drifting from a word for which they had been asked to provide associations.
3. Hypersensitivity of the autonomic system to stress, indicated by stronger GSRs to stressful noise, greater classical conditioning, greater generalization of the conditioned response, and slower extinction of the conditioned response among the "sick."

A still later analysis (Mednick, 1970) revealed that 70 percent of the mothers of the "sick" high-risk group exhibited at least one pregnancy or birth complication, whereas only 15 percent of the mothers of the "well" high-risk subjects had done so.

From the beginning, Mednick and Schulsinger (Mednick, 1958) had hypothesized that schizophrenia is a learned disorder that is predisposed by autonomic hyperactivity. The individual reacts easily to stress with anxiety, which then facilitates the production of irrelevant thoughts. These, in turn, act to relieve the anxiety by substituting for the thoughts that originally caused the anxiety, the irrelevant thinking thereby being reinforced. The results of the Mednick-Schulsinger project lend some support to their hypothesis, implicating pregnancy and birth complications in the excessive reactivity of the autonomic functions. An independent study to further investigate the specific complications involved and the role they play is underway.

Furthermore, plans have been made for a longitudinal intervention project to be conducted on the island of Mauritius (Mednick, Schulsinger, and Schulsinger, 1975). It will involve identifying preschoolers who show autonomic functioning similar to that of the subjects in the Denmark study and training them in certain competence skills. Although early identification of children who later may have psychiatric difficulties and intervention to reduce such difficulties is a major long-term goal of vulnerability research, there is some question that present knowledge is sufficient as a basis for such intervention (Garmezy, 1974b).

The overall commitment to vulnerability research appears strong, however, and several projects are being conducted in the United States. As with all longitudinal research, reliable and relevant information will be obtained slowly and only with considerable vigilance, but the potential fruitfulness of these projects toward understanding and preventing severe behavioral disturbance is undoubtedly worth the effort.

SUMMARY

Childhood psychoses involve severe disturbances in perception, thinking, movement, language, emotions, and social interaction. They can be classified into *childhood psychoses* and *early infantile autism.*

Kanner first suggested the existence of a unique syndrome of early infantile autism that, unlike schizophrenia, is present from birth. According to Rimland, autistic children differ from other psychotic children in several ways: they are unusually attractive; their families are of high intellectual, educational, and occupational levels; and they manifest particular motor and intellectual abilities, normal EEGs, severe language deficits, a need for environmental sameness, and a striking aloneness. Data from Rimland's parental checklist provide some support for the syndrome.

Several etiologies for psychoses have been put forth. Bender believes they are genetically predisposed and brought on by physiological upset. Rimland hypothesizes that autism is caused by lack of oxygen (anoxia) before or at birth, which impairs the brain's ability to associate new with old stimuli. Bettelheim argues that the autistic child psychologically withdraws from an unresponsive environment. Some theorists still tend to blame parents for the disturbances.

The prognosis for severe behavior disorder is unfortunately poor; perhaps 65 to 75 percent of psychotic children remain unable to lead independent adult lives.

Neurotic reactions are relatively mild problems such as excessive aggression; enuresis and encopresis; anxieties, fears, and phobias, and psychosomatic disorders. They are quite prevalent, show some sex differences, and often disappear spontaneously.

Excessive aggression is often maintained by environmental contingencies. Enuresis and encopresis may have constitutional components but also are problems of inappropriate learning. Anxieties, fears, and phobias are related to traumatic learning experiences or general child-rearing practices. Psychosomatic disorders frequently involve a strained parent-child relationship—for example, a lack of personal closeness.

Various approaches to treatment of behavior problems exist. The Freudian approach views behavior problems as symptoms of underlying unconscious conflict, and treatment is aimed at uncovering the conflict. Critics point out that the effectiveness of this approach is questionable. Nondirective treatment assumes that individuals have powerful strivings for self-realization, and its purpose is to permit children the freedom to reach this potential. The psychoeducational approach aims at providing academic and social reeducation: Project Re-ED is an outstanding example of this approach. Behavior modification is based on the premise that problem behavior is learned and can be modified directly by new learning experiences. Employing direct observation, systematic manipulation, and ongoing evaluation, behavior modifiers apply classical and operant conditioning and modeling to treatment.

The relationship between childhood disorder and adult behavior is not well understood. Evidence exists that aggressive and antisocial behavior in children is related to antisocial behavior in adulthood. The lack of reliability and relevancy of the data collected in retrospective or follow-back studies weakens this method. Many prospective or follow-up studies are now underway to examine the possible determinants of severe behavior disorders. Regarding evaluation of high-risk children, the clearest finding so far points to a relationship between psychological breakdown and pregnancy and birth complications.

The Road to Maturity

CHAPTER 16

OUTLINE

ADOLESCENCE: THE TRANSITION FROM CHILDHOOD TO ADULTHOOD
  Physical Maturation
  Changing Social Relationships: Orientation away from the Family
  The Youth Culture and Alienation
  Antisocial Behavior in Adolescence: Juvenile Delinquency
  Adolescents and Drug Use
  Adolescence as a Crossroad: Vocational Choice
  Love and Marriage
REACHING FULL MATURITY
  Biological and Health Changes
  Changes in Intellectual Performance
  Social-Psychological Aspects of Aging: Age Norms
  Change in Status: Retirement and Economic Well-being
  The Later Years: Disengagement or Activity?
  The End of Life
  Facing Death
  Selection 10—How the Old Face Death
SUMMARY

Infancy and childhood are times of rapid change and growth, and developmental psychologists have traditionally focused on these early years. Recently, however, there has been an increasing interest in development over the entire life span. Covering the metamorphosis of human life in detail is beyond the intended scope of this book, but it is appropriate to close by turning briefly to maturity—the culmination of many of the processes that have been discussed thus far.

ADOLESCENCE: THE TRANSITION FROM CHILDHOOD TO ADULTHOOD

There are no clear boundary years to define adolescence. Generally, the period may be said to begin with puberty, the onset of physical maturation (twelve to fourteen years of age), and to terminate when the individual assumes such adultlike responsibilities as marriage, full-time employment, or a serious commitment to career training, usually between the ages of eighteen and twenty in our culture.

As noted in Chapter 1, only in the past few hundred years or so has society gradually come to recognize childhood as a formative period of life, distinguishable from adulthood. *Adolescence* did not emerge as a separate category until the last two decades of the nineteenth century (Demos and Demos, 1972). Since then it has been studied by workers with diverse interests—anthropologists, sociologists, and psychologists. Although viewed somewhat differently from these perspectives, two themes have been central: adolescence is a transition period of uniquely dramatic "storm and stress," and a search for individual identity is of paramount importance.

The storm of adolescence—fact or fiction? G. Stanley Hall, in his early volumes on adolescence (1904; 1905), was particularly influential in propagating the "storm and stress" viewpoint. Hall interpreted adolescence as representing a step in the development of the entire species of *Homo sapiens*, a step characterized by conflict between impulses such as sensitivity versus cruelty, selfishness versus altruism, and radicalism versus conservatism. Storm and stress, therefore, was seen as an inherent, continuing experience throughout adolescence.

From psychoanalysis came support for the idea that upheaval is a necessary and even positive aspect of adolescent development. Anna Freud spoke directly to this issue:

> We know that the character structure of a child at the end of the latency period represents the outcome of long drawn-out conflicts between id and ego forces. The inner balance achieved . . . is preliminary only and precarious. . . . [I]t has to be abandoned to allow adult sexuality to be integrated into the individual personality. The so-called adolescent upheavals are no more than the external indications that such internal adjustments are in progress.
>
> . . . We all know individual children who as late as the age of fourteen, fifteen, or sixteen show no such outer evidence of inner unrest. . . . They are, perhaps more than any others, in need of therapeutic help to remove the inner restrictions and clear the path for normal development, however "upsetting" the latter may prove to be. [1972, pp. 317–318]

But not all investigators take this stance. Bandura (1964), speaking from the social-learning view, argues that the inevitability of storm and stress during adolescence is exaggerated. He notes that society sensationalizes upheaval, makes generalizations from deviant youth, and overemphasizes adolescent nonconformity (e.g., faddish dress)—all of which contribute to the storm and stress hypothesis. Bandura does not maintain that adolescence is problem free, but he is inclined toward casting it as one more developmental period with particularly critical transitions.

FIGURE 16–1
The use of alcoholic beverages appears to serve as a rite of passage into adulthood in our culture. Mimi Forsyth, Monkmeyer.

Anthropologists have long noted that cultures differ in the amount of support they provide during the adolescent transition. Some cultures clearly demark the entrance into adulthood by rituals, such as puberty rites, which make it easier for the child to assume the adult role. This kind of support may be inadequate in our culture, and adolescents may themselves try to provide rites of passage by engaging in certain activities. It has been suggested, for example, that an important aspect of alcohol consumption by high school students is that society institutionalizes drinking as part of adulthood (Maddox and McCall, 1964). In addition to lack of transitional support, the adolescent period in a technical society is a long one—so long, in fact, that young adulthood is sometimes now described in terms of transition. In short, it is difficult to achieve a sense of stability or of "having arrived."

Achieving identity Earlier we had occasion to note the work of Erikson in describing development as a series of psychosocial stages through which each individual passes. One of Erikson's greatest contributions has been to focus on the adolescent's struggle to establish an identity. So critical is this crisis that Erikson labels the adolescent stage as the period of identity versus role confusion (see pp. 278–79). The basis of the struggle lies not only in societal demands regarding impending adulthood but also in the physical changes rapidly taking place. Previous trust in one's physical being and bodily functions is now seriously questioned and can be reestablished only by a reevaluation of the self (Maier, 1969). Adolescents seek to discover who they are and what they will become.

How does the adolescent achieve this vital identity? Erikson suggests that our culture allows a moratorium during which the rapidly developing child has the opportunity to become integrated into society. A certain amount of experimentation is expected, so that the adolescent may indeed "try on" various commitments and identities much as one tries on new garments before selecting the best fit. This "trying on" is manifested in many ways: endless examination with others of the self, vocations, ideologies; a rich fantasy life involving the taking of a variety of roles; identification with particular individuals, frequently involving a herolike worship. Settling on a vocation is particularly important in this process, and the inability to do so disturbs many young people. It may result in overidentifying to the point of apparent loss of self. "Falling in love," too, can be a means to arrive at a definition of self by seeing oneself reflected and gradually clarified through another (Erikson, 1963). Erikson's analysis incorporates many of the experiences of adolescence. The following sections will delineate some of them.

PHYSICAL MATURATION

Some of the adolescent's concern certainly stems from ongoing physical changes. There is, at this time, both a general growth spurt of tissues such as muscle and bone and sharply accelerated maturation of the reproductive system (see p. 62). Some physical changes are sufficiently gradual to be almost unnoticeable; others, such as growth in height, breast development, or the appearance of whiskers, are readily apparent. The adolescent, therefore, must adjust not only to an evolving new self but also to the reactions others display to the new image. At no other time, perhaps, is there so great a social emphasis on sex-related physical beauty and normative growth.

The rate of physical development varies considerably across individuals, as can be seen in Figure 16–2, which shows two adolescent boys and two adolescent girls of the same chronological age. There is also a regular difference between the sexes in physical maturity, with girls advancing more rapidly than boys, so that, for a given age, they are almost inevitably more mature than their male counterparts. Girls show maximum growth rate at approximately twelve and one-half years of age, whereas maximum growth rate for boys occurs on the average over two years later. Girls also reach full maturity several years before boys. The pattern of sex differences in body height as a function of age is illustrated in Figure 16–3. Note that between the ages of eleven and thirteen, girls are actually taller than boys, although by adulthood males are taller than females by an average of more than four inches.

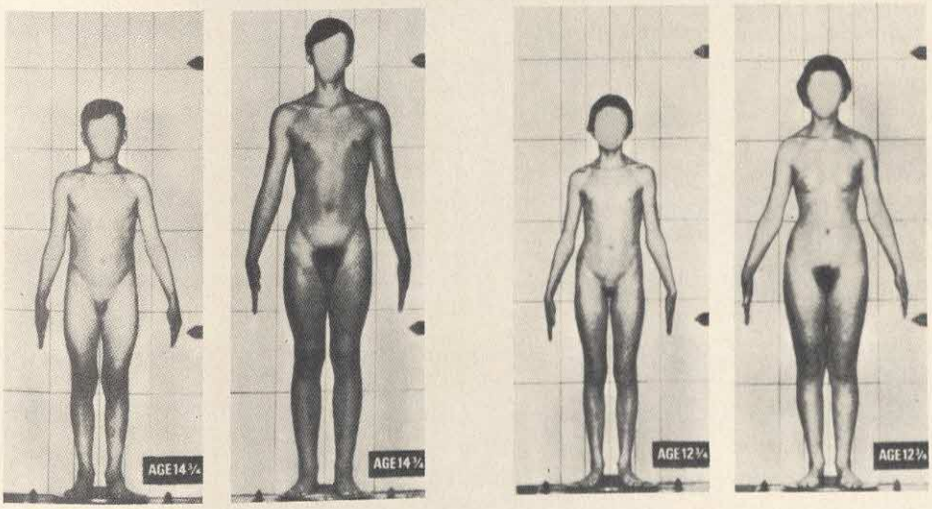


FIGURE 16–2
Photographs of adolescents of the same age, illustrating differences in rates of maturation. From J. M. Tanner, in P. H. Mussen, *Carmichael's Manual of Child Psychology*, 3rd ed., Vol. I. Copyright 1970, reproduced by permission of John Wiley & Sons, Inc., and Dr. James M. Tanner.

Early-maturing boys appear to enjoy some distinct advantages. One longitudinal study, the Oakland Growth Study, found that during adolescence early maturers were more likely to be elected class officers, have their names in the school newspaper, and, not surprisingly, excel athletically (Jones, 1958). Although these advantages tended to diminish as physical differences disappeared, the general success patterns of the early maturers continued into the third decade of life: they were poised, responsible, and achieving in the conventional way. Late maturers were,

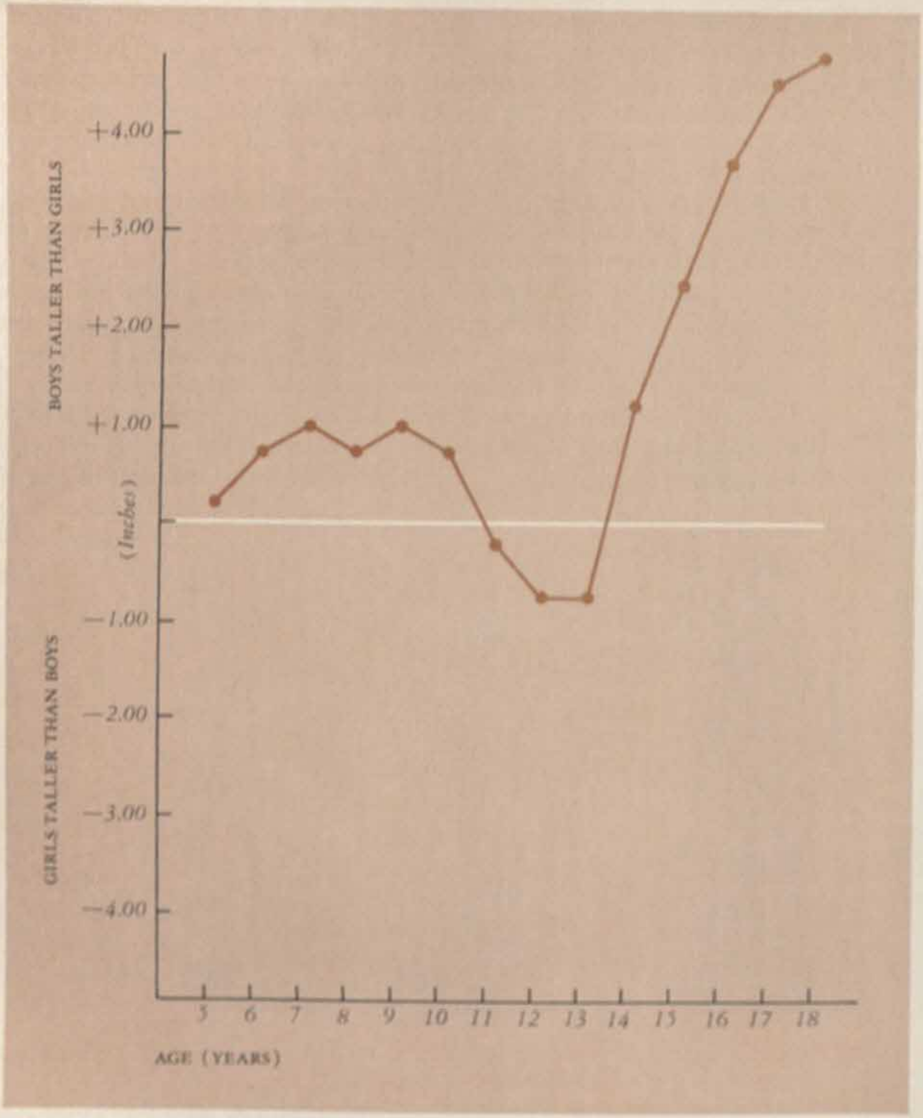


FIGURE 16-3
Differences in height between boys and girls at various ages. Data from E. H. Watson and G. H. Lowrey, Growth and Development of Children. Chicago: Year Book Medical Publishers, Inc., 1962, pp. 72–73.

in their thirties, active, exploring, insightful, perceptive, independent, and impulsive (Jones, 1965)—not all negative characteristics by any means. Overall, though, the early-maturing male is given an edge over his late-maturing peer.

What factors account for the advantages that accrue to early-maturing boys? Undoubtedly there are many. They may be given tasks, privileges, and responsibilities usually assigned to older individuals and, providing these challenges are met, may derive personal satisfaction and rewards from others (Eichorn, 1963). Early maturers also have superior physical strength (Carron and Bailey, 1974), a characteristic that along with physical capability is tied closely to the concept of masculinity.

The possible influence of physical capability is demonstrated in a study in which twelve- to fourteen-year-old boys were tested in gym classes and were given either positive or negative feedback about their performance (Ludwig and Maehr, 1967). Positive feedback emphasized that their physical development was quite good for their age level, whereas negative feedback implied that performance was poor for their age level. Both before and after the test, measures were taken of the boys' self-concepts. The results indicated that self-concept improved after positive feedback and declined after negative feedback. Furthermore, feedback influenced the boys' later-stated preferences for physical or nonphysical activity, with the positive feedback group showing increased preference for physical activity and the negative feedback group showing decreased preference.

Girls' physical development undoubtedly influences their feelings about themselves and their behavior in similar ways, but the effects of early and late maturation are less clear-cut. The early-maturing girl is several years ahead of her male peers and may also be viewed unfavorably by her female peers. She is "embarrassingly" large and may experience menstrual flow while her age-mates are still ignorant of the process. It is not surprising, then, that sixth-grade girls evaluate their prepuberal female classmates more positively than those who have already matured sexually. This differentiation soon reverses, however; in junior high school girls who have reached puberty are more popular than those who have not (Faust, 1960).

CHANGING SOCIAL RELATIONSHIPS: ORIENTATION AWAY FROM THE FAMILY

Another quite dramatic change occurring in adolescence involves a shift in social relationships. The child who was predominantly a member of the family becomes a member of both the family and the peer group. He or she suddenly belongs to another generation—and one that may seem uniquely different from the preceding generation.

Bowerman and Kinch (1969) examined this transition by studying the relative orientation toward family or peers in 686 fourth- to tenth-graders in a middle-class school. The youngsters completed questionnaires that permitted conclusions about (1) the extent to which they identified with either family or peers, (2) the group with which they preferred to associate, and (3) the group whose values and norms they considered most like their own.

To assess *identification,* subjects were asked whether family or friends understood them better and whether they would rather become the kind of persons their parents are or the kind their friends presumably would be. For *association orientation,* they were asked which group they most enjoyed doing things with, and which one they would rather spend time with. For the *normative orientation,* subjects were queried as to whose ideas were most like theirs with respect to decisions of right and wrong, things that are fun to do, the importance of school, and what they would do if one group wanted them to do something of which the other did not approve.

The youngsters were allowed to choose family, friends, or a neutral response indicating that they felt the same about the two groups. For each of the three types of orientation, subjects were categorized as neutral if there were an equal number of family and peer choices or if choices were neutral; as family-oriented if there were more family than peer choices; and as peer-oriented if the choices were predominantly of friends. A combined orientation rating was made from the three separate orientation ratings.

As Table 16–1 shows, there was a dramatic shift in all aspects of orientation with age; 87.1 percent of fourth-graders but only 31.6 percent of tenth-graders expressed a family orientation on the combined score. There was, on the other hand, an increase not only in peer orientation but in the percentage of individuals showing orientation equally toward family and friends. The greatest shift was in association—

TABLE 16–1
PERCENTAGE OF FOURTH- THROUGH TENTH-GRADERS DEMONSTRATING FAMILY, PEER, OR NEUTRAL ORIENTATIONS

	GRADE IN SCHOOL			
	4th	*6th*	*8th*	*10th*
Combined Orientation				
Family	87.1	80.2	41.7	31.6
Neutral	6.9	11.2	18.3	20.2
Peer	5.9	8.6	40.0	48.1
Normative Orientation				
Family	82.2	69.8	33.0	30.4
Neutral	5.9	12.1	14.8	19.0
Peer	11.9	18.1	52.2	50.6
Association Orientation				
Family	75.2	62.1	20.9	15.2
Neutral	15.8	25.0	39.1	29.1
Peer	8.9	12.9	40.0	55.7
Identification				
Family	81.2	77.6	57.4	51.9
Neutral	13.8	18.1	24.3	21.5
Peer	5.0	4.3	18.2	26.6

Source: Adapted from Bowerman and Kinch, 1969.

reflecting the adolescent's preference to spend time with his or her agemates. Interestingly, 51.9 percent of tenth-graders still identified most closely with family.

In discussing the transition of social relationships, Bowerman and Kinch observed:

> . . . the nature of family interaction is affected by the decreasing participation and interest of the child in family activities as he becomes more involved in peer association; by the decline of the family as the primary source of affection with increasing attachment to peers; and by the weakening of authority and control of the parents as the child grows in independence and as norms and values of parents must compete for acceptance with those of peers. These are among the reasons why this transitional period is one of potential increase in parent-child conflict, due not only to the striving of the child to achieve status in two important primary groups with conflicting or competing interests, but also to the difficulties which parents as well as children experience in reacting to the changing situational and interactional characteristics of interpersonal relationships. [P. 137]

Conflict is not inevitable, however; its occurrence depends upon a multiplicity of factors. Other data collected by Bowerman and Kinch suggested that family-peer orientation was affected by the adolescents' opinions as to how well they got along with their family, how their families treated them, whether they received attention from the family, and whether personal problems were discussed in the family. Adolescents also perceive family life as happier when parents discuss family problems and when they respect the opinions of the offspring than when these factors are absent (Slocum, 1958).

The struggle for autonomy One of the focal points of conflict, when it does occur, is the struggle on the part of young people for autonomy and independence. Dependence and independence do not exist as polar opposites; children may become independent in one area or in relation to some individuals but may increase their dependence in other areas or in relation to other people. Complete independence is not possible and has been described, in a memorable phrase, as "an unnamed form of insanity" (Dewey, 1920). Nevertheless, the desire of adolescents to run their own lives—to decide what they will wear, where they will go, what activities they will engage in, what values they will adopt—frequently runs counter to the established role of authority to which parents are accustomed.

Some parents tend, perhaps simply out of habit, not to want to relinquish decision-making power. Others recognize the need for autonomy for their offspring but are concerned with the speed and circumstances under which it occurs (Campbell, 1969). In either case, variation can be found in how parents deal with the development of autonomy.

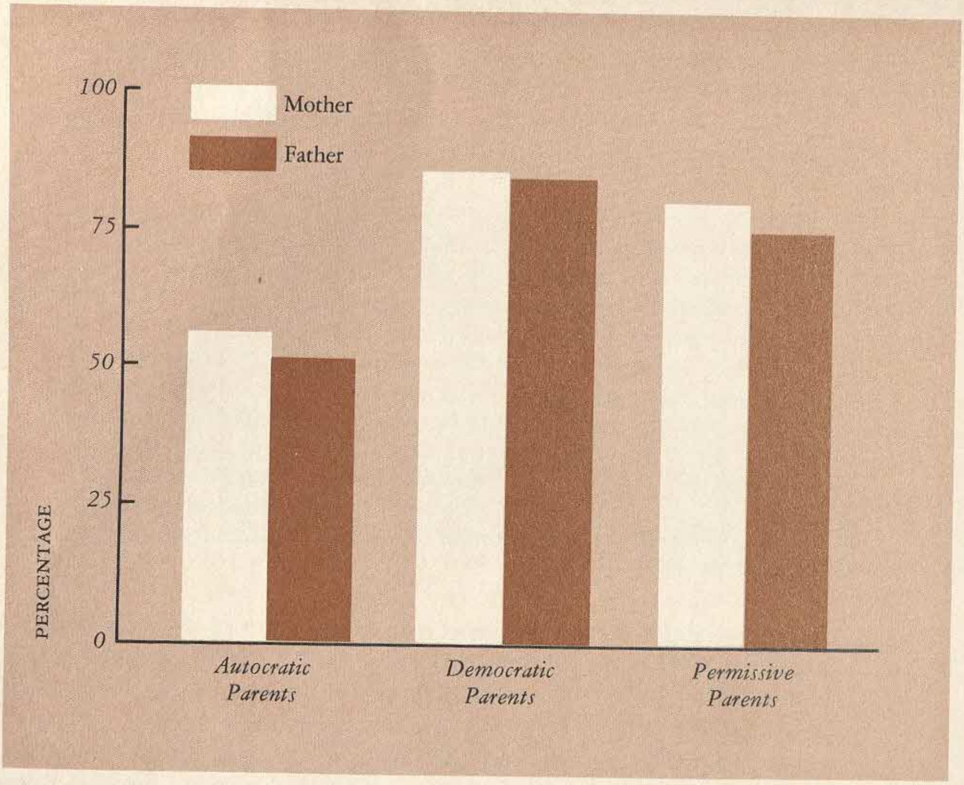


FIGURE 16–4
Percentage of adolescents perceiving their parents as "fair" according to the parents' child-rearing practices. Adapted from Elder, 1962.

In this regard, adolescents in grades seven through twelve were requested to rate the behavior of their parents (Elder, 1962). From their answers, seven descriptive categories emerged, ranging from the autocratic parent who allowed no expression of views of self-regulation of behavior by the adolescent, through the democratic parent, to the ignoring parent who took no role in the directing of his or her offspring.

The students also were asked whether they thought their mothers' and fathers' ideas, rules, or principles were good and reasonable, or wrong and unreasonable. Children from democratic homes were most satisfied with the policies of their parents, whereas children from autocratic homes were least satisfied (Figure 16–4). Interestingly, at least three-fifths of the students expressed a favorable disposition toward their parents' policies *regardless* of the extent to which they were allowed self-regulation. This raises the important question of just how different adolescents are from their parents.

THE YOUTH CULTURE AND ALIENATION

After examining reports by students from ten high schools in the Midwest that varied in size and description, James Coleman (1960, 1961) concluded that adolescent groupings in high school form nothing short of a subculture quite distinct from adult society:

> Industrial society has spawned a peculiar phenomenon, most evident in America but emerging also in other Western societies: adolescent subcultures, with values and activities quite distinct from those of the adult society—subcultures whose members have most of their important associations within and few with adult society. Industrialization, and the rapidity of change itself, has taken out of the hands of the parent the task of training his child, made the parent's skills obsolescent, and put him out of touch with the times—unable to understand, much less inculcate, the standards of a social order which has changed since he was young [1960, p. 337]

Coleman's work has led many to view adults and adolescents as existing in antagonistic, impenetrable spheres. Others argue that the distance between the generations is not nearly so severe, that adolescents consider their parents important, show concern about parental disapproval, and conform to parental or peer wishes, depending upon the immediate issue at hand (Douvan and Adelson, 1966; Epperson, 1964; Rosen, 1955). There is also evidence (Costanzo and Shaw, 1966) that the influence of peers is high during early adolescence but then decreases. Still others argue from a different stance that a youth culture, to the extent that it exists, might actually serve in reducing problems during adolescence (e.g., Ausubel, 1954; Campbell, 1969; Eisenstadt, 1956; Matza, 1961). They note the following:

1. In a complex society, the family, with a relatively simple structure of control going from parents to children, cannot provide adequate experience that is relevant to other relationships. Operating within a peer group allows adolescents to experiment with a greater variety of other situations, thereby preparing them to assume roles of responsibility and authority.
2. The peer group serves both as a standard against which to measure one's accomplishments and as a same-aged group that judges more objectively than family. In this sense, it provides independent status to the adolescent.
3. It provides opportunity for practicing and discussing alternative roles, behaviors, and identities.
4. It sometimes protects adolescents from coercion that adults might impose.
5. Since all adolescents share some of the same experiences, the peer group gives support during transition and decision making concerning social, academic, and occupational matters.
6. It also may lessen the burdens adults would have to bear if they assumed complete responsibility for their offspring.
7. Finally, the peer group actually may decrease the likelihood of deviancy by providing institutionalized forms of behaviors that otherwise might be labeled delinquent.

Despite the more optimistic arguments that the generation gap is not so wide as usually noted and that the youth culture may be a positive phenomenon, the problem of alienation is of major concern today.

Although youth has virtually always been considered *alienated* in the sense of becoming autonomous and not subordinate to older generations, the term presently refers to a more dramatic break between adolescents and their families and society. It implies or assumes the disruption of a previous relationship that was positive, desirable, or natural (Cambor, 1973). The term also frequently denotes an overt rejection of the values of the society, and a concomitant construction of a different set of values supported by the youth culture.

But do adolescents hold personal, social, and political values fundamentally different from those of their parents? One national survey (Yankelovich, 1972) revealed that 70 percent of students held mainstream political views, and among the remainder, radicals were outnumbered by conservatives two to one. What does seem at issue is that adolescents are discouraged that societal institutions do not work successfully and flexibly toward the values that the young, in fact, share with the older generations. The young feel hopeless, powerless, and apathetic (Bronfenbrenner, 1972). To what can we attribute this situation?

Bronfenbrenner suggests that the major underlying factor is the breakdown of institutions that have borne the burden of the development of the young—the family, and the support systems that enable the family to function, the school, neighborhood, and community. Modern urban technical progress has removed adults from the home and has left children to the influence of the peer group and the mass media. Thus the adolescent suffers from a

> profound and crippling moral dilemma. By and large, he identifies with the ideals and values of his society, but he has been taught to recognize the widespread betrayal of these ideals and values in everyday life, and has been given only minimal exposure to the substantial, if only occasional, achievements of the ideal, and—even more critically—to the concrete courses of action through which the ideal might be pursued. Neither in school, nor in the university, is he given much information or, above all, experience in how to use the institutions of his society—both public and private—to remedy social and political ills. In terms of social action, all he knows is the simplistic, one-shot [demand or destroy] so characteristic of the context in which he has spent so much of his time—the age-segregated peer group and the commercial television screen. For those coming from environments in which the family was still strong, the aggressive impulse is inhibited by early-internalized humanistic values, but there is little knowledge or experience with an alternative course of action for resolving human problems by institutionalized means. [1972, pp. 665–666]

Bronfenbrenner argues that this situation must be remedied by change in the social institutions, such as modification of work schedules to allow parents to spend more time with their children, an enhancement of the status of women in the home and on the job, reacquaintance of the young with the world of work, and reintegration of the schools with the rest of society (e.g., by having older children actively work with younger ones). In short, it is necessary that adults and youth be provided settings in which they live and grow side by side with opportunity for meaningful communication and sharing.

ANTISOCIAL BEHAVIOR IN ADOLESCENCE: JUVENILE DELINQUENCY

Feelings of alienation may be expressed in antisocial behavior; thus juvenile delinquency may fruitfully be thought of in psychological and sociological terms. There is no one explanation for juvenile delinquency—it is one of many possible kinds of "adjustments" considered a maladjustment on the basis of the current social norms (Kuhlen and Thompson, 1970).

Characteristics of delinquents: The Healy and Bronner study

Although much of our knowledge of human development is fairly recent, occasionally we find that an older study, through the imagination and foresight of the investigators, has provided knowledge that still is pertinent. Such a case exists in the study of juvenile delinquency, a classic investigation by William Healy and Augusta Bronner (1936).

These investigators began with a sample of 133 families, each of which had at least one delinquent youngster. Among this group they found 105 delinquents who had a nondelinquent sibling (in eight cases, a twin) with whom a comparison could be made which held at least socioeconomic and certain family factors constant.

Healy and Bronner found some remarkable differences in the physical health and general developmental history of delinquents as compared with nondelinquents. Some of their findings are listed in Table 16–2, from which it can be seen that there is a uniform and striking pattern of poor physical health among the delinquents compared with the nondelinquents, both through development and at the time of the study. It is not possible, of course, to determine directly any causal relationships from such data. A poor medical history might provide frustrations and impediments in a youngster's life which in turn might lead to delinquent behavior. On the other hand, certain kinds of difficult behavior might be linked to physical defects through some genetic factor.

Perhaps one of the more fascinating outcomes of the Healy and Bronner study is the *lack* of differences between delinquents and nondelinquents in intellectual ability. But the groups were just as surprisingly different on another dimension: hyperactivity. Healy and

TABLE 16–2
SOME CONTRASTS BETWEEN 105 DELINQUENTS AND THEIR NONDELINQUENT CONTROLS FROM THE SAME FAMILIES

CHARACTERISTIC	NUMBER OF CASES *Delinquents*	 *Controls*
Developmental History		
Much worried pregnancy	10	3
Very sickly pregnancy	13	6
Very difficult delivery	12	5
Much underweight in early childhood	12	5
Very early bottle fed	10	8
Very late breast fed	7	4
Cross fussy babyhood	14	5
Difficult sphincter training	31	13
Many illnesses or severe illness	28	8
History of distinctly good health	44	75
Physical Conditions at Time of Study		
Weight deviates (more than 10% under or 20% over)	11	10
Retarded sexual development	5	1
Defective vision—more than slight	17	6
Markedly enlarged or diseased tonsils	20	12
Nasal obstruction	6	2
At least some badly carious teeth	27	19
Miscellaneous liabilities	7	3

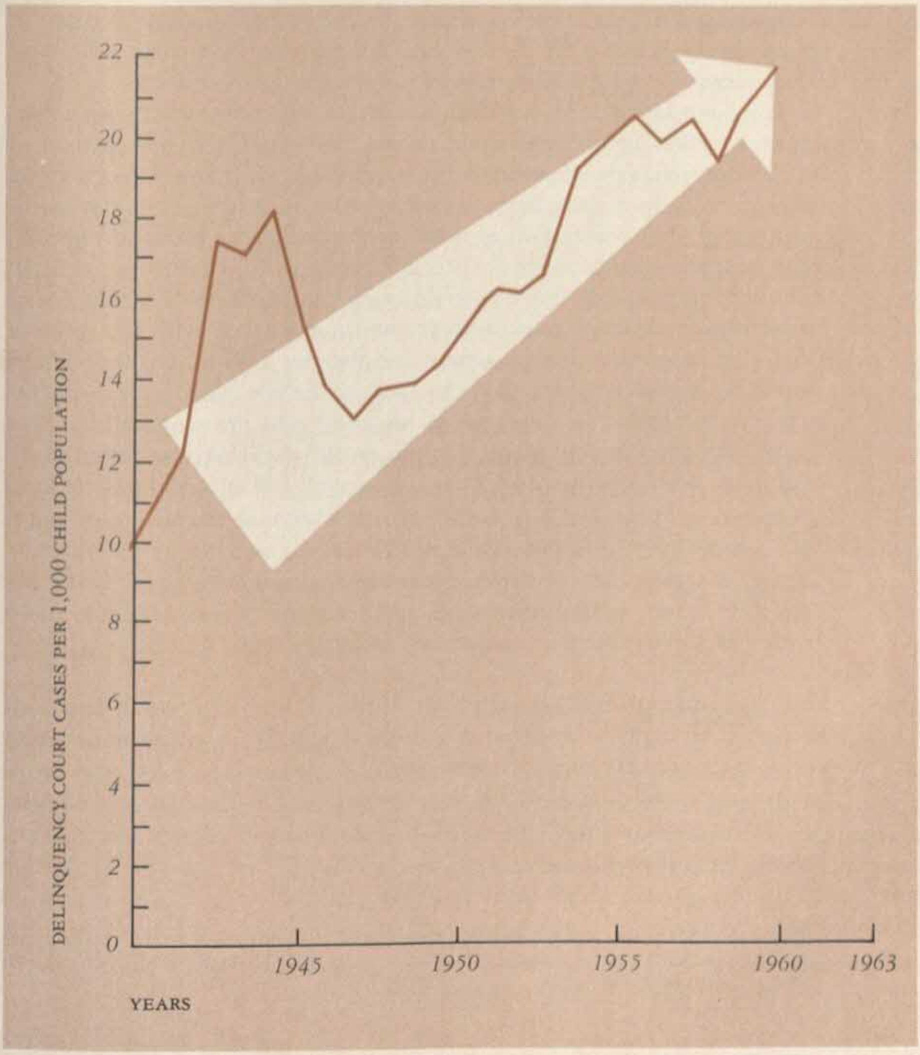
Source: Adapted from Healy and Bronner, 1936.

Bronner found that almost half—fully forty-six—of the delinquent youngsters in their study exhibited hyperactivity, "overrestlessness," and the like, whereas not one of the control youngsters from the same family and matched for age could be so characterized. Additionally, they experienced greater feelings of rejection, insecurity, inadequacy, unhappiness, and guilt.

The investigators also sought information as to exactly how delinquent tendencies and behaviors had been acquired. The research was remarkably prescient for its day. In their evaluation of movies, for example, it was learned that a large percentage of the delinquents (much larger than was true for the controls) attended the movies excessively, several times a week or more often if they were able to, and sometimes stayed to see a performance over and over again. Indeed, a few of the delinquents actually stated that they had patterned their own criminal behavior after material that they had seen in gang and crime motion pictures. Equally important, Healy and Bronner report that what we would now think of as the "social-learning history" of delinquents conspired to produce much of their antisocial behavior. They had been, in the investigators' terms, "loaded with ideas of delinquency" from a mixture of sources, such as the communications and observations of delinquent companions and detective or crime stories and the movies.

There is no doubt that the opportunities for being educated in crime have increased markedly in the past few decades with the advent of various forms of mass media entertainment and communications describing such activities in great detail. Whether or not these changes are a causal factor, juvenile delinquency has been increasing in the United States for many years (see Figure 16–5), and the rate of increase is higher for minority than for majority groups and for females than for males.

FIGURE 16–5
The rise in juvenile delinquency between 1940 and 1963. Adapted from Beck, 1965.



Delinquency among females Traditionally, fewer violent crimes have been committed by females than by males. Sex-role assignment has "allowed" males to act aggressively and violently and has encouraged them to display such behavior as a way of demonstrating masculinity. Female delinquency, on the other hand, has usually been less severe "acting out" that is related to specific problems—school failure, broken homes, sexual involvement, and the like. More recent studies, however, have shown less difference in the nature of delinquent behavior by males and females (Kratcoski and Kratcoski, 1975; Wise, 1967). For example, the number of violent crimes committed by females under eighteen years of age rose 18 percent from 1970 to 1971 and has continued to increase since then (Kratcoski and Kratcoski, 1975). One explanation for this is the changing female sex role, which may foster such behavior.

Delinquency among the affluent It is not difficult to hypothesize factors underlying delinquency among the poor, but explanations are not as immediately obvious in the case of adolescents who, superficially at least, appear to be growing up in comfortable circumstances.

One investigator (Pine, 1966) has offered several hypotheses to account for the phenomenon. He notes, first of all, that the period of adolescence has been extended, particularly for the college-going middle and upper class, from the midteens to at least age twenty-one or twenty-two. The tacking on of additional years to the transition period, Pine suggests, produces an "existential vacuum" for the young; without meaning or purpose, there is an increase in rebellious behavior. And, ironically, adolescents must at the same time contend with the tremendous pressures of society to achieve during the high school and college years. Pine also suggests that changes in middle-class values—particularly with regard to delay of gratification and the work ethic—may contribute to a lessening of discipline and decreased self-control of impulses; with a reduction of both external and internal restrictions, increased delinquency is not a surprising outcome. Finally, Pine notes that successful social mobility is itself a basis for some types of delinquency inasmuch as the adolescent may feel insecure about being accepted in a new environment and may temporarily lose identity, and a contempt for traditional institutions and beliefs may result.

ADOLESCENTS AND DRUG USE

Increased use of illicit drugs in the United States was one of the most dramatic changes to occur in the 1960s. In general, more males than females, more city dwellers than rural or urban residents, and more young than older individuals are involved with illicit drugs (Goode, 1970).* A national study of 1,987 high school and college students reported the following facts:

**Ethanol* (drinking alcohol) and *nicotine*, the addicting product of the tobacco plant, are powerful and widely abused drugs, often not viewed as such simply because they can be obtained and possessed legally.

> . . . two-thirds of the college and almost one-half of the high school students had experimented at least once or twice with illicit drugs, typically marijuana.
>
> . . . 41% of the college and 26% of the high school students considered themselves regular users.
>
> . . . 8% of the college and 6% of the high school students smoked marijuana daily.
>
> . . . high school students were more likely than college students to get high on barbiturates, LSD, cocaine, and even heroin (several times a month).
>
> . . . illicit drugs had not replaced alcohol; 79% of college and 58% of high school students reported that they drank alcohol, even though most believed that it is more dangerous than marijuana.
>
> [Yankelovich, 1975]

Society has expressed considerable interest about the effects of illicit drugs: whether they foster crime, cause psychoses, underlie birth defects, lead to increased drug consumption, or can result in physical or psychological dependency. These questions cannot, in fact, be analyzed across the board but at the very least require examination of the particular drug involved and the degree to which it is used.

With regard to marijuana, evidence suggests that immediate reactions to the usual dosage lead to neither psychotic episodes nor crime. The issue of dependence is less clear, although marijuana is not addictive and does not lead to a need for increased levels. Nevertheless, there are several worldwide reports of its chronic, heavy consumption resulting in decreased conventional motivation and a rise in social indifference (*Marihuana and Health*, 1971). The problem in interpreting these data, however, is the problem of correlation: perhaps individuals who are poorly motivated are especially attracted to the drug. A similar interpretation problem exists when progression to other drugs is investigated. For example, Blum (1969) found in one student survey that marijuana was associated with the use of other illicit drugs. This fact, though, does not establish a causal link; as he notes, it may point to a *general disposition* to use psychoactive drugs as a means to alter states of consciousness and social relations.

There are, of course, many reasons why adolescents use drugs (cf. Girdano and Girdano, 1973; Greenspoon, 1971; Nowlis, 1969). One of them is to escape misery, whether it be the pain of the ghetto or the anxiety and conflict felt by all people. Nowlis (1969) points out that, for the student, misery may involve the anxiety of being enmeshed in an achieving society, the inability to find an identity, and the lack of meaningful experiences in an environment that is increasingly becoming secular and depersonalized. Temporarily, at least, drugs provide the opportunity simply to escape and drop out from facing these problems. But the escape is not, in all cases, just getting away; rather, it is putting one's self into a situation in which one draws into a personal inner world, frequently sharing the experiences with others. In a related way, many marijuana users point to the drug's mind-expanding effects as a positive experience in their lives.

One way to better understand drug use is to identify patterns of use and nonuse and relate them to the people involved. Such a tactic was taken by Yankelovich (1975) in the previously cited investigations of high school and college students. He found that those who abused drugs (as defined by their treatment in drug centers), compared with drug users, were more likely to turn on by themselves, keep drugs on hand, feel isolated, and suffer from depression, frustration, and anxiety. Yankelovich also identified two groups of nonusers: *moral nonusers* and *conscious nonusers*. The former were politically and socially conservative, believing in the importance of family, hard work, patriotism, religion, and laws. Conscious nonusers, making up about 23 percent of all students, were similar in many ways to users: they had a tendency to reject authority, to seek excitement, and to espouse social values that grew out of the 1960s concerning liberal sexual mores, self-fulfillment, money as the criterion of success, automatic patriotism, and so forth. But unlike the users, they had made a decision not to consume drugs, apparently because they considered them dangerous. According to Yankelovich (1975):

> What seems to have happened is that the old lines between drug users and nonusers have blurred. Smoking marijuana, and to a lesser extent trying other kinds of drugs, no longer stands for protest and revolution. The majority of students in America, both in high school and college, have experimented with drugs, and the number who smoke grass regularly belong to the mainstream, along with the Conscious Nonusers. We cannot predict drug use solely on the basis of political and personal values or personality type, because many young people with liberal and experimental views have chosen not to use drugs of any kind.

ADOLESCENCE AS A CROSSROAD: VOCATIONAL CHOICE

Ideally, each of us should have the opportunity to be occupied in a vocation that suits our talents, interests, and personality. It is, in fact, not a simple matter, even for adults, to assess themselves adequately, to be aware of the wide range of vocations and how to prepare for them, and then to make a realistic "best" choice. For the adolescent, the task is even more difficult and, unfortunately, the ideal is perhaps seldom achieved.

We may ask, then, What factors, for good or bad, determine vocational choice? It is possible to conceptualize them broadly into several categories.

Society's needs and rewards

In a very real sense, society sets the limits within which any young person can realistically choose a vocation. Today there is considerably less opportunity for agricultural and unskilled workers than previously because our society has become highly technical. At the same time, many recent Ph.D.'s and teachers have difficulty finding work because society's needs in these areas have shrunk or because too many people have prepared for them.

Aside from changing demands, other social determinants come into play (Blau, Gustad, Jessor, Parnes, and Wilcock, 1968). Individuals must meet the functional requirements of any job; that is, they must be trained for any one particular opening. They also must fulfill nonfunctional requirements, such as age, race, and sex. Finally, the amount of reward given by a society—in terms of financial return, prestige, or freedom—determines which adolescents will enter certain vocations.

Social class and parental attitudes Vocational aspirations of adolescents are clearly related to their socioeconomic background, with youth from the higher classes selecting the more prestigious vocations (Caro and Pihlblad, 1965; Hollingshead, 1949). This pattern is demonstrated by the results of one study in which adolescents from a small midwestern city listed their preferred future occupations. Of those categorized in Classes I and II, the higher social strata, 77 percent chose business and professional vocations, whereas only 7 percent of those in Class V did so (Figure 16–6). Many of the adolescents of the lower social strata also were undecided about their future.

Although it is possible that adolescents of various social classes hold different values in regard to occupations, other reasons probably exist for this finding. Children often follow in their parents' vocations simply because they are rewarded for doing so. Some lower SES youths may be discouraged from upward job mobility because it is threatening to the older generation, but, for the most part, parents of *all* classes, including the poor, have high aspirations for their offspring. So the problem may be more that lower SES adolescents simply lack the information about how to enter certain vocations, or they may consider aspiring to them unrealistic. In any event, parental attitude is an important influence on adolescent vocational strivings regardless of social class. One study, for example, has shown that working-class boys whose parents encourage mobility are more likely to move in this direction than are those who do not have such support (Simpson, 1962). As might be expected, too, the more adolescents identify with their parents, the more similar their interests and attitudes about vocation will be to those of the parents (Crites, 1962).

Sex differences There are two striking sex differences in vocational selection. The first is that selection itself is considered far more important for the male than for the female. Occupational choice not only potentially defines the social status of the male and his family but is considered intricately tied to his identity as a male and as a person. For many adolescent girls, choosing an occupation means merely picking a job that will serve as a stopgap until they settle down to homemaking. The high percentage of women in the work force belies this notion; however, many working women still do not view their occupations as central to their identity.

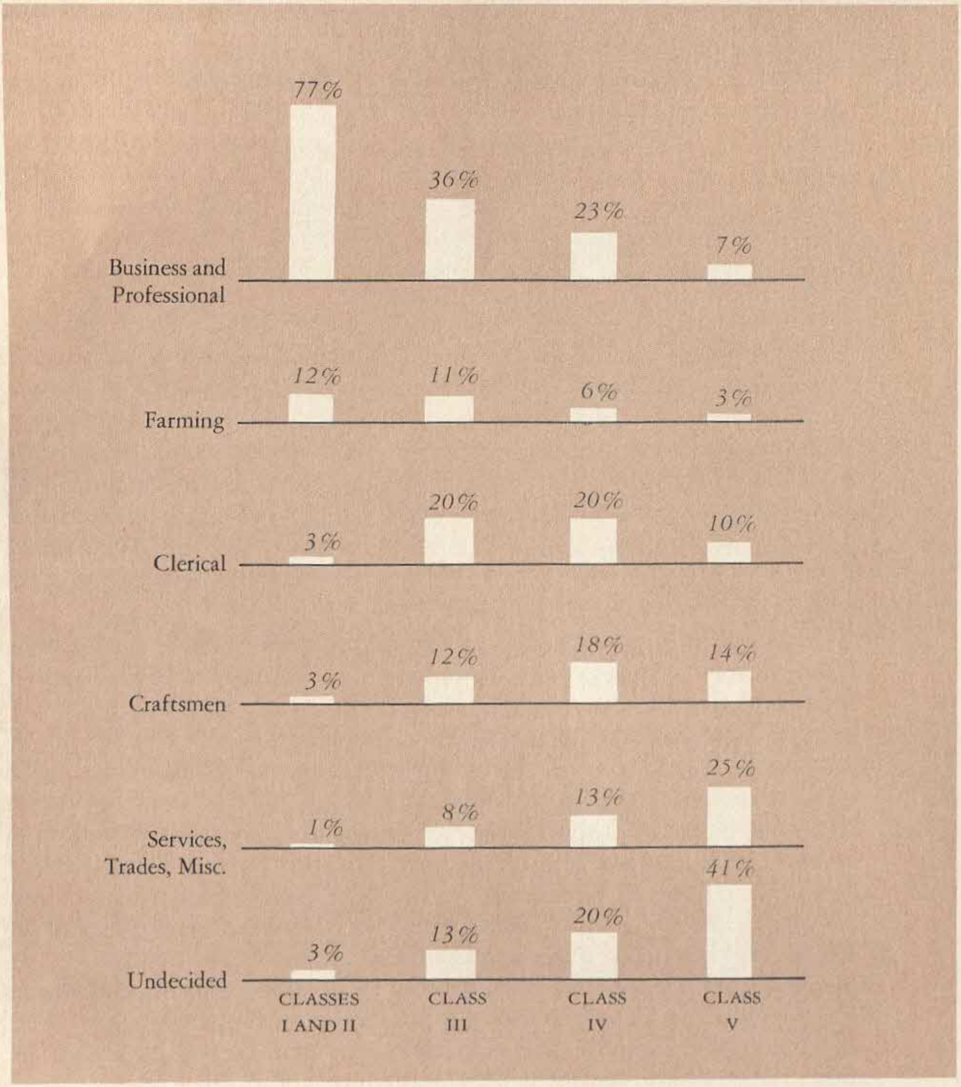


FIGURE 16–6
Percentage of adolescents of different socioeconomic class selecting various occupational aspirations. Adapted from Karl C. Garrison, *Psychology of Adolesence*, 5th ed., p. 418, © 1956. Reprinted by permission of Prentice-Hall, Inc., Engle-Wood Cliffs, New Jersey.

The second difference is that females more than males have consistently chosen less professional occupations that are strongly characterized by helping, such as secretary, nurse, teacher, and stewardess (Witty, 1961). In a cross-national survey, male choices varied somewhat depending upon the country lived in, but females from all six nations included in the survey chose minor professional vocations over major ones (Steward and Williamson, 1969). The underlying factor undoubtedly is the sex stereotyping of occupations that has been, and largely still is, rigid. Such stereotyping precludes both males and females from entering certain areas of work, but occupations usually considered male are the more prestigious and valued in society. To opt for them, a female not only must compete with males but also may feel that she is jeopardizing her success as a female.

Horner (1972) postulated that women avoid commitment to certain professional careers because they fear the negative consequences that could accrue: social rejection, failure in personal relationships with males, failure as a parent, being considered cold and aggressive, and the like. She tested this proposition by asking individuals to complete a story that began as follows: "After first-term finals, Anne found herself at the top of her medical-school class . . ." High percentages of females wrote stories that indicated their belief in the negative consequences of career success to women. Although the data collected in subsequent "fear of success" studies have been inconsistent (Zuckerman and Wheeler, 1975), it appears that women's freedom of occupational choice is still precarious.

LOVE AND MARRIAGE

Until recently, remarkably little was known about attitudes toward love and marriage or how they changed developmentally or with experience. Some of the first systematic research addressed to this question was conducted by Knox and Sporakowski (1968). They argue that attitudes about love can be thought of as arranged on a continuum, with one extreme being romantic love and the other extreme being conjugal love. Romantic love, as they define it, is characterized by perceiving love as a mysterious, strange, and incomprehensible force; a romantic attitude toward love typically includes the notion that one falls in love at first sight, that love alone should be the criterion for marriage, that true love is eternal and comes only once, and the like. Included also is an extreme feeling of urgency associated with love and an emphasis upon the feeling of excitement, thrills, and palpitations of the heart that are associated with it. This last characteristic, often associated with the views of adolescents, is referred to by Knox and Sporakowski as "cardiac respiratory" love.

The opposite of romantic love, according to these investigators, is conjugal love. Characterized by a realistic orientation, this is the sort of love that one would expect to exist between two people whose relationship is primarily calm, solid, and comforting. The contrast can be seen best by examining some of the items devised by Knox and Sporakowski, shown in Table 16–3.

With this distinction in mind, it becomes possible to obtain some information on attitudes toward love among individuals over a variety of ages, backgrounds, and so on, and to compare these with the experience of marriage. In one study, Knox and Sporakowski (1968) administered their scale to one hundred male and one hundred female college students between the ages of eighteen and twenty-two, all of whom were single. Results indicated some striking relationships. For example, males were somewhat *more* romantic than females in their attitudes

TABLE 16–3

SOME OF THE ITEMS USED TO EVALUATE ATTITUDES TOWARD LOVE

Please read each statement carefully and circle the number which you believe most adequately represents your opinion.

1. Strongly agree (definitely yes)
2. Mildly agree (I believe so)
3. Undecided (not sure)
4. Mildly disagree (probably not)
5. Strongly disagree (definitely not)

When you are really in love, you just aren't interested in anyone else.	1 2 3 4 5
Love doesn't make sense. It just is.	1 2 3 4 5
When you fall head-over-heels-in-love, it's sure to be the real thing.	1 2 3 4 5
Love isn't anything you can really study; it is too highly emotional to be subject to scientific observation.	1 2 3 4 5
To be in love with someone without marriage is a tragedy.	1 2 3 4 5
When love hits, you know it.	1 2 3 4 5
Common interests are really unimportant; as long as each of you is truly in love, you will adjust.	1 2 3 4 5
It doesn't matter if you marry after you have known your partner for only a short time as long as you know you are in love.	1 2 3 4 5
As long as two people love each other, the religious differences they have really do not matter.	1 2 3 4 5
You can love someone even though you do not like any of that person's friends.	1 2 3 4 5

Source: Knox and Sporakowski, 1968.

toward love at this age. Why should this be the case? Knox and Sporakowski suggest that the views of females are less romantic and more practical because they have somewhat more at stake in the relationship. Another interesting finding is that despite the stereotype of the adolescent as being swamped with the notion of romantic love, in a relative way both males and females were more conjugal than romantic in their views toward love.

Knox and Sporakowski also divided their sample according to the age of the respondents; freshmen, sophomores, juniors, and seniors all participated in the study. Again, a clear relationship was found: in this case, perhaps unsurprisingly, the older the student, the less romantic and more conjugal was his or her attitude toward love.

In a later study, Knox (1970) administered the attitudinal scale to people older and younger than the college students in the original sample. Specifically, the second study included one hundred high school seniors, one hundred people who were married less than five years, and one hundred who were married more than twenty years. Interestingly, a clear difference was found between the attitudes of the high school seniors and of those who were married less than five years, with the high school seniors showing a "romantic" orientation while a more "realistic" orientation was found among the young married adults. A clear difference also was found when comparisons were made between individuals married less than five years and those married more than twenty years. Contrary to many views, individuals married twenty years were *not* less romantic than those married five years or less; they were more romantic. It appears, then, that the growing years of marriage brought individuals increasingly to the view that a mystical "one true love" view was correct. In fact, the views of high school students and of persons married over twenty years did not differ from one another, but both were significantly more romantic than those of young marrieds of less than five years.

REACHING FULL MATURITY

The adult years of life are obviously a continuation of much of what has gone before. But they also bring inevitable physical, social, and psychological change. We shall examine some of these by turning first to the work of several investigators who have conceptualized the adult years in terms of some kind of developmental stages or tasks.

The best known once again is Erikson, who couches adulthood in three stages, each of which involves a psychosocial crisis: young adulthood (intimacy vs. isolation), middle adulthood (generativity vs. stagnation), and later adulthood (ego integrity vs. despair). According to Erikson, the crisis that faces the young adult is to establish sharing and caring relationships with others that involve personal commitment. It is usually the time during which marriage occurs and a family is begun. Failure to develop in such a way can lead to isolation. With movement into middle adulthood, it is necessary to extend this commitment to a wider range of people, to want to take on the guiding and nurturing of the younger generation. Failure to be "generative" can result in stagnation that is characterized by excessive self-indulgence. Finally, in the later years, development focuses on integration of life's experiences—on embracing them as inevitable aspects of oneself—and in accepting an orderliness in life and death. If integration is not achieved, the individual suffers from despair.

In a somewhat different vein, Havighurst (1953) describes development in terms of a variety of tasks that must be mastered at specific times. Successful competence at any one stage depends upon the mastery at earlier times. Although the tasks may be motor, intellectual, emotional, or social, they tend to fall into the realm of the psychosocial

TABLE 16–4
HAVIGHURST'S DEVELOPMENTAL TASKS OF ADULTHOOD

TASKS OF EARLY ADULTHOOD	TASKS OF MIDDLE AGE	TASKS OF LATER MATURITY
1. Selecting a mate.	1. Achieving adult civic and social responsibility.	1. Adjusting to decreasing physical strength and health.
2. Learning to live with a marriage partner.	2. Establishing and maintaining an economic standard of living.	2. Adjustment to retirement and reduced income.
3. Starting a family.	3. Developing adult leisure-time activities.	3. Adjusting to death of spouse.
4. Rearing children.	4. Assisting teenage children to become responsible and happy adults.	4. Establishing an explicit affiliation with one's age group.
5. Managing a home.	5. Relating oneself to one's spouse as a person.	5. Meeting social and civic obligations.
6. Getting started in an occupation.	6. Accepting and adjusting to the physiological changes of middle age.	6. Establishing satisfactory physical living arrangements.
7. Taking on civic responsibility.	7. Adjusting to aging parents.	
8. Finding a congenial social group.		

Source: Copyright 1953 by Longmans, Green, and Co., Inc. From the book *Human Development* by Robert J. Havighurst. Reprinted by permission of the Davis McKay Co., Inc.

in the adult years, such as assuming social responsibility, establishing a family, and adjusting to the death of loved ones (see Table 16–4).

An example of related ongoing empirical work is that of Levinson and his associates; their immediate goal is to construct a detailed psychosocial framework of male development during the age span ranging from twenty to forty-five years (Levinson, Darrow, Klein, Levinson, and Braxton, 1974). This project is notable because it is based on actual interviews with men of four different occupational groups. So far several developmental periods have been delineated, including a mid-life crisis that occurs at about forty years (Table 16–5). The generalizability of this framework to men of other cultures and to women remains for further investigation, but we might expect that it will not hold completely.

TABLE 16–5
PERIODS OF PSYCHOSOCIAL DEVELOPMENT OF MEN DURING EARLY AND MIDDLE ADULTHOOD, AS DELINEATED BY LEVINSON AND HIS ASSOCIATES

PERIOD	APPROXIMATE AGE SPAN
Leaving the family	16–18 to 20–24
Getting into the adult world	Early 20s to early 30s
(Transition)	(29 to early 30s)
Settling down	Early 30s to early 40s
(Becoming one's own man)	(Mid 30s to late 30s)
Mid-life transition and beginning of middle adulthood	Early 40s to mid 40s

Source: Levinson, Darrow, Klein, Levinson, and Braxton, 1974.

All of the above conceptualizations reflect recognition that individuals continue to change and develop as unique beings in a variety of ways, though perhaps not as rapidly as during the first decades of life.

BIOLOGICAL AND HEALTH CHANGES

There is a general biological decline in all humans beginning at about age thirty, but it is gradual and varies greatly in the rate and degree of decrements peculiar to the different organ systems. As shown in Figure 16–7, the speed of nerve conduction, for example, declines little; metabolic rate diminishes less than 20 percent between the ages of thirty and ninety; but maximum breathing capacity is reduced to less than one-half of its full level. Markedly different patterns also are found for the various sensory systems. Auditory sensitivity begins to decline relatively early (see p. 105) and is often pronounced by age sixty. On the other hand, visual acuity and taste remain quite constant until age fifty and

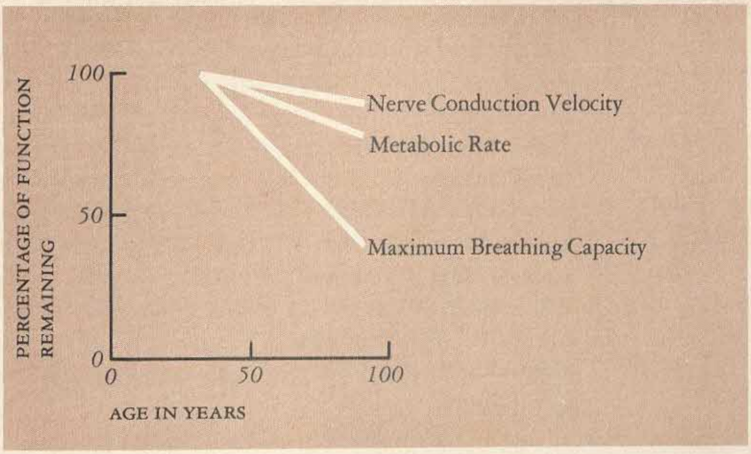


FIGURE 16-7
Loss of biological capacity with age varies across different functions. From D. Hershey, *Lifespan and Factors Affecting It.* Springfield, Ill: Copyright Charles C Thomas, 1974, p. 37, by permission.

then begin to decline (Corso, 1971). Adding to this variability are large individual differences among those over sixty-five; physicians encounter eighty-year-olds who physiologically resemble individuals twenty years younger.

Increasing age brings an increasing number of long-term chronic illnesses, with arteriosclerosis being most common. By age sixty-five more than one-half of all Americans have some form of heart disease, and an almost equal number are afflicted with arthritis. The rate of acute or short-term diseases, though, is lower for those over sixty-five years than for members of any other age group. In the course of living, individuals build up a large number of immunities that lower their susceptibility to many diseases (Estes, 1969). However, when older people do succumb to an illness, their activities are restricted for a greater number of days.

Nevertheless, older people are relatively optimistic about their health. When Shanas (1968) interviewed twenty-five hundred senior citizens concerning their own estimate of their health, 52 percent stated that they were in good health, 30 percent said their health was fair, and only 18 percent indicated that they were in poor health. Fully 75 percent considered their own health better than that of their contemporaries. It is interesting, too, that no direct relationship exists between age and how the elderly evaluate their health; that is, as many eighty-year-olds as sixty-five-year-olds rate their health as good or fair. Apparently, they take age norms into consideration because infirmities that might lead individuals of age sixty-five to declare their health poor result in very different conclusions in those over eighty (Shanas, 1968). We shall see later that age norms are important in other ways as well.

CHANGES IN INTELLECTUAL PERFORMANCE

For many years it was believed that intellectual functioning, as measured by IQ scores, began to decline early in adulthood. The basis for this opinion was cross-sectional investigations that showed that IQ scores were lower for samples of adults than for samples of younger individuals. Eventually, however, longitudinal studies produced different information; namely, that intellectual performance generally is maintained into adulthood and may even increase. How can this discrepancy be explained? The nature of the different research designs underlies the dilemma.

Cross-sectional studies of different age groups do indeed tap differences in IQ scores for the different ages, but they also tap generation, or *cohort,* differences. Consider, for example, the hypothetical case of a group of sixty-year-olds who obtained an average IQ of 95 while a group of twenty-five-year-olds obtained an average IQ of 105. Can it be concluded that aging itself is responsible for this apparent change over time? No, it cannot, because the two age groups may have had different experiences relevant to intellectual performance. The twenty-five-year-olds undoubtedly had more formal education and may have experienced greater encouragement to achieve, better nutrition, and more practice in taking standardized tests. Perhaps these cohort differences, rather than age itself, underlie the higher IQ scores obtained by the twenty-five-year-olds. In fact, cross-sectional studies do not demonstrate age *changes,* but merely age *differences* (e.g., Kimmel, 1974; Schaie, 1970). When age differences are controlled, what can be concluded about IQ changes over time?

Green (1969) conducted a cross-sectional study in change in IQ scores among Puerto Rican citizens between ages twenty-five and sixty-four and noted the same kind of pattern that had led other investigators to conclude that after adolescence there is a steady decrease in intelligence (e.g. Bromley, 1966). However, Green also observed that the older subjects, on the average, had received fewer years of education, and he hypothesized that reduced educational experience rather than age was responsible for the result. When he adjusted the analysis so that educational level was equated for all age groups, he found that full-scale IQ scores increased until age forty and thereafter remained constant. When verbal and nonverbal sections were examined separately, it was found that verbal intelligence steadily increased from ages twenty-five to sixty-four, while nonverbal intelligence was constant from twenty-five to forty, after which it showed some decline. At least for those under sixty-four, age per se did not appear to be associated with any overall decline in intelligence.

Using a longitudinal design, Blum, Jarvik, and Clark (1970) reported trends in IQ change among individuals between ages sixty-five and eighty-five. They found a small decline in intelligence test scores between sixty-five and seventy-three and a much steeper decline between seventy-three and eighty-five. Like Green, they also observed that the rate of change for different parts of the intelligence test was not constant. On tests of pure information, such as vocabulary, no decline was observed through age eighty-five, whereas on tests requiring speed or perceptual-spatial reasoning, the decline was already sharp between ages sixty-five and seventy-three. Thus it appears that a meaningful exploration of the relationship between aging and intellectual performance must examine the effects on different aspects of intellectual functioning.

A number of investigators have hypothesized that the largest decrements in IQ are exhibited by those close to death. In keeping with this theory, Blum *et al.* found that IQ decrements between ages sixty-five and seventy-three were smaller for those who lived to the age of eighty-five than for those who died before then. Adding support, Reimanis and Green (1971) tested residents of a Veteran's Administration hospital at mean age fifty-eight, and again ten years later, and found that IQ scores of those who died within one year of the second testing had declined significantly more between the two tests than the scores of those who lived longer.

Citing these findings and others of a similar nature, Riegel and Riegel (1972) postulated a "predeath drop." According to the Riegels' formulation, the intelligence of most individuals, at least until age seventy, remains constant. They presented evidence that before this age almost all of the observed decline in average intelligence was accounted for by sharp drops among those destined not to survive the next five years. In the over-seventy category, even long-term survivors exhibited some declines, but the decrements among nonsurvivors were much greater. Riegel and Riegel therefore proposed that declines in the average intelligence of aging individuals resulted from increasing numbers of individuals experiencing "terminal drops" in performance rather than from all of the aged experiencing steady declines.

SOCIAL-PSYCHOLOGICAL ASPECTS OF AGING: AGE NORMS

One of the ways in which society orders itself is through the establishment of age norms: individuals of different ages are expected to behave differently from those of other ages and to assume different roles. The recognition of age norms is demonstrated in Table 16–6, which shows the high agreement among a middle-class, middle-aged sample as to the appropriateness of certain characteristics or behavior for persons of various ages. To the extent that society places contingencies on age-normative behavior, age norms become a guide or a constraint. People are inclined, then, to "act their age" and establish roles "on time." This, in turn, feeds back to stabilize their own perceptions of themselves as aging organisms (Neugarten, Moore, and Lowe, 1965).

There is some evidence that older people perceive age constraints more strongly than do younger people. Neugarten and her associates (1965) queried different age groups about whether they thought certain behaviors were appropriate at certain ages and whether they approved or disapproved of them. Here are some of the thirty-nine items involved in this survey:

. . . A woman who feels it's all right at her age to wear a two-piece bathing suit to the beach (when she's 45, 30, 18).

. . . A woman who decides to have another child (when she's 45, 37, 30).

. . . A man who's willing to move his family from one town to another to get ahead in his company (when he's 45, 33, 25).

. . . A man who still prefers living with his parents rather than getting his own apartment (when he's 30, 25, 21).

. . . A couple who move across the country so they can live near their married children (when they're 40, 55, 70).

TABLE 16–6.
CONSENSUS AMONG MIDDLE-CLASS, MIDDLE-AGED PEOPLE REGARDING THE APPROPRIATE TIME FOR VARIOUS CHARACTERISTICS AND BEHAVIOR

CHARACTERISTICS OR BEHAVIOR	AGE RANGE DESIGNATED AS APPROPRIATE OR EXPECTED	PERCENT WHO AGREE ON THE AGE RANGE	
		Men *(N = 30)*	*Women* *(N = 43)*
Best age for a man to marry	20–25	80	90
Best age for a woman to marry	19–24	85	90
When most people should become grandparents	45–50	84	70
Best age for most people to finish school and go to work	20–22	86	82
When most men should be settled on a career	24–26	74	64
When most men hold their top jobs	45–50	71	58
When most people should be ready to retire	60–65	83	86
A young man	18–22	84	83
A middle-aged man	40–50	86	75
An old man	65–75	75	57
A young woman	18–24	89	88
A middle-aged woman	40–50	87	77
An old woman	60–75	83	87
When a man has the most responsibilities	35–50	79	75
When a man accomplishes most	40–50	82	71
The prime of life for a man	35–50	86	80
When a woman has the most responsibilities	25–40	93	91
When a woman accomplishes most	30–45	94	92
A good-looking woman	20–35	92	82

Source: Adapted from Neugarten, Moore, and Lowe, 1965.

As Figure 16–8 indicates, the older people evidenced a higher perception of age constraint than did the younger. The investigators interpreted these results in light of the older population's having learned that age is a reasonable criterion by which to evaluate behavior and that to be "offtime" brings negative social and psychological consequences.

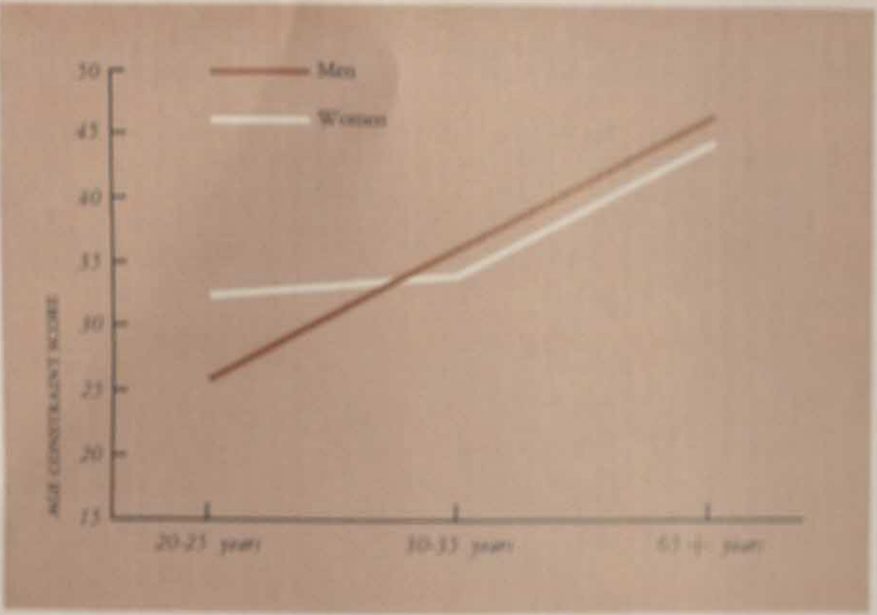


FIGURE 16-6
Perceptions of age constraints in adulthood. With age, people are increasingly constrained by age norms. From Neugarten, Moore, and Lowe, 1965.

CHANGE IN STATUS: RETIREMENT AND ECONOMIC WELL-BEING

Our society is youth oriented, and considerable power and prestige rests with the middle-age adult. In contrast, the elderly have low status; they have lost previous power and little value is placed on their years of learning by experience. A wrinkled face is therefore not a positive sign of accumulated wisdom but a negative representation of the inevitable deterioration of life. Age status does interact with other variables, such as occupational role and economic level; those of the upper social class do not retire in the same way as others, and their economic situation secures them a measure of status. Nevertheless, many of the elderly are in an unfavorable position.

Retirement from occupational roles has become increasingly common. In 1960, 25 percent of the heads of households who were sixty-five years of age or older were employed full time; by 1969, this figure had dropped to 14 percent (Strumpel, 1975). Retirement originated as a voluntary act or as a way of society's caring for people unable to work, but it has become mandatory in many instances. Interestingly, this policy has not been implemented at some of the highest occupational levels, such as those involving Supreme Court justices and U.S. senators. The capable performance of individuals in their seventies and eighties in these positions suggests that mandatory retirement policies stem more from a national difficulty in supplying sufficient numbers of jobs to accommodate all who wish to work than from general incapability of those over sixty-five to perform in their previous occupation.

Decrement in status occurs when an individual who has been employed in a respected occupation for a number of years no longer occupies that role. As might be expected, morale is affected. In the first year after retirement a greater percentage of blue- than white-collar retirees actually express a high degree of satisfaction with their circumstances (Stokes and Maddox, 1967). The blue-collar workers may have fallen less far in status, and the leisure of retirement may seem a welcome substitute for their previous occupations. Over time, however, the pattern reverses; white-collar workers retired more than three years appear more contented than their blue-collar counterparts. It has been hypothesized that this is because of the white-collar workers' greater number of outside interests and nonwork activities suited to old age.

Kutner, Fanshel, Togo, and Langner (1970) found that men experienced a far greater decrement in morale between the ages of sixty-five and sixty-nine than women. Again, this can be explained in terms of role change; most men are employed before they are sixty-five and not afterward, whereas women more often continue in the same homemaker role that they occupied when they were younger.

Kutner and his associates also found that—independent of income—elderly citizens who worked indicated higher morale than those who did not. This held true for those earning less than $25 per week, for those earning between $25 and $50, and for those whose incomes exceeded $50 per week. Even though poor health and other indisposing factors may have contributed to the lower morale of those who were not employed, the evidence is nevertheless suggestive that, for those over sixty-five, continuing in some employed capacity may entail rewards above and beyond financial gains, related perhaps to feelings of usefulness and to social interaction.

Nevertheless, the direct contribution of economic well-being cannot be ignored. In the Kutner sample, virtually one-half of those rated well-to-do, compared with less than one-fourth of those rated low in socioeconomic status, reported a high degree of contentment. There is also a differential impact of health according to economic well-being. For those of low socioeconomic status, health was significantly related to morale; for those who were wealthier, this relationship was not present. We might ask further, then, about the economic level of the aged as a group.

How well off are the aged in the United States compared with the remaining population? On the average, they are worse off (Table 16-7), despite a higher overall allotment of monies to the elderly. It appears that more old people are maintaining independent homes rather than moving in with their families, and they do so at an economic loss. Also, as might be expected, income inequality during the working years becomes accentuated with old age (Strümpel, 1973).

TABLE 16–7
FAMILY INCOME OF THOSE UNDER AND THOSE OVER 65

	MEDIAN INCOME	
AGE OF HEAD OF FAMILY	*1959*	*1968*
Under 65	$5,800	$7,322
65 or older	1,946	2,696

Source: Strümpel, 1973.

THE LATER YEARS: DISENGAGEMENT OR ACTIVITY?

Related to the event of retirement is Cumming and Henry's disengagement theory, which is based largely on the study of healthy, economically secure fifty- to ninety-year-olds. These investigators set out to determine what their sample of older people were like, and they did so by several interviews over a period of a few years. Specifically, they wanted to test their observation that aging is an "inevitable mutual withdrawal or disengagement, resulting in decreased interaction between the aging person and others in the social system he belongs to" (1961, p. 14). They were able to trace a decline in interaction by examining such aspects as the number of social roles held by the elderly, the amount of time spent with various other people, and the reactions of the aged to their own lives.

Several of the Cumming and Henry hypotheses or assumptions are provocative. They suggest, for example, that disengagement involves not only the withdrawal from others (except for intimate kin) but also a concomitant preoccupation with the self. An important factor in precipitating this shift is a change in perception of time. The individual begins to measure life in terms of time from death, instead of time from birth, and realizes that the years are too few. Thus, many activities once considered important are put aside as having only *previous* value. The disengaged, according to Cumming and Henry, are tranquil as they gradually loosen or sever their ties with earthly things. Additionally, these events are considered universal happenings that probably help ease tensions between generations, involving, as they do, the "moving over" of the elder for the younger generation.

Although there is little disagreement that people are involved in less social interaction as they become old, disengagement theory has not been well received. It is argued that the source of withdrawal is not the individual's desire but a society that pushes the elderly into inactivity. Furthermore, many behavioral scientists resist the notion that the disengaged person is content and tranquil. In short, it is not at all clear that inactivity and focus on the self is the optimal condition of the aged (cf. Botwinick, 1973).

Several experiments have been addressed to these issues, many of them proposing that *activity* (interpersonal or otherwise), and not disengagement, is positively correlated with high morale. In general, the weight of the evidence seems to support this notion (Botwinick, 1973; Maddox, 1965). As we have already seen, retirement frequently leads to depression, as does the loss of the homemaker role. Successful aging (as determined by self-report scales and ratings of old people in general) also is associated with active daily pursuits by the elderly (Schonfield, 1973). Health, however, remains an important variable, regardless of activity-nonactivity. Personality may also be important. Havighurst, Neugarten, and Tobin (1968) described several "types" of people, some of whom seem to be successful with disengagement. They have high self-concept, are self-directed, and are interested in the world, although not particularly in its interpersonal aspects. Disengagement also may be satisfying to dependent and passive people. Clearly, it is a mistake to stereotype the elderly, thereby ignoring individual needs and desires and forcing them into particular life patterns.

For example, there is considerable discussion about the optimal living conditions of the aged in terms of the impact of living with peers versus living with younger people. Frequently, emphasis is placed on the value of contact with those of the younger generation. However, Rosow (1967) examined the relation between living circumstances and friendship patterns among twelve hundred aged residents of Cleveland; he was especially interested in the effects on those over sixty-five of having few or many age peers living in close proximity. The study's most basic finding was that the greater the concentration of old people, the more friends each resident made. This result was in direct opposition to theories of social integration that stress the importance of older individuals living among younger ones. The density of senior citizens residing in the immediate area was particularly important to working-class individuals; whereas those of higher socioeconomic status were likely to have friends outside of the neighborhood, former blue-collar workers depended almost exclusively on those who lived nearby for extra-familial companionship. The same tendency applied also to those older than seventy-five; they too drew very heavily on their age peers in the immediate neighborhood for friendship.

Nevertheless, individuals exhibited a wide range of attitudes concerning their social lives. Rosow identified four basic themes that seemed common to fairly large groups within the population. He labeled "cosmopolitan" the approximately 30 percent who had little contact with their neighbors and appeared content with the arrangement. The 20 percent who visited infrequently and desired more interpersonal stimulation were termed "isolated." The label "sociable" was applied to the 23 percent who indicated a high degree of social contact and who were satisfied with their social lives; the term "insatiable" was reserved for the 10 percent having a high level of contact and desiring more.

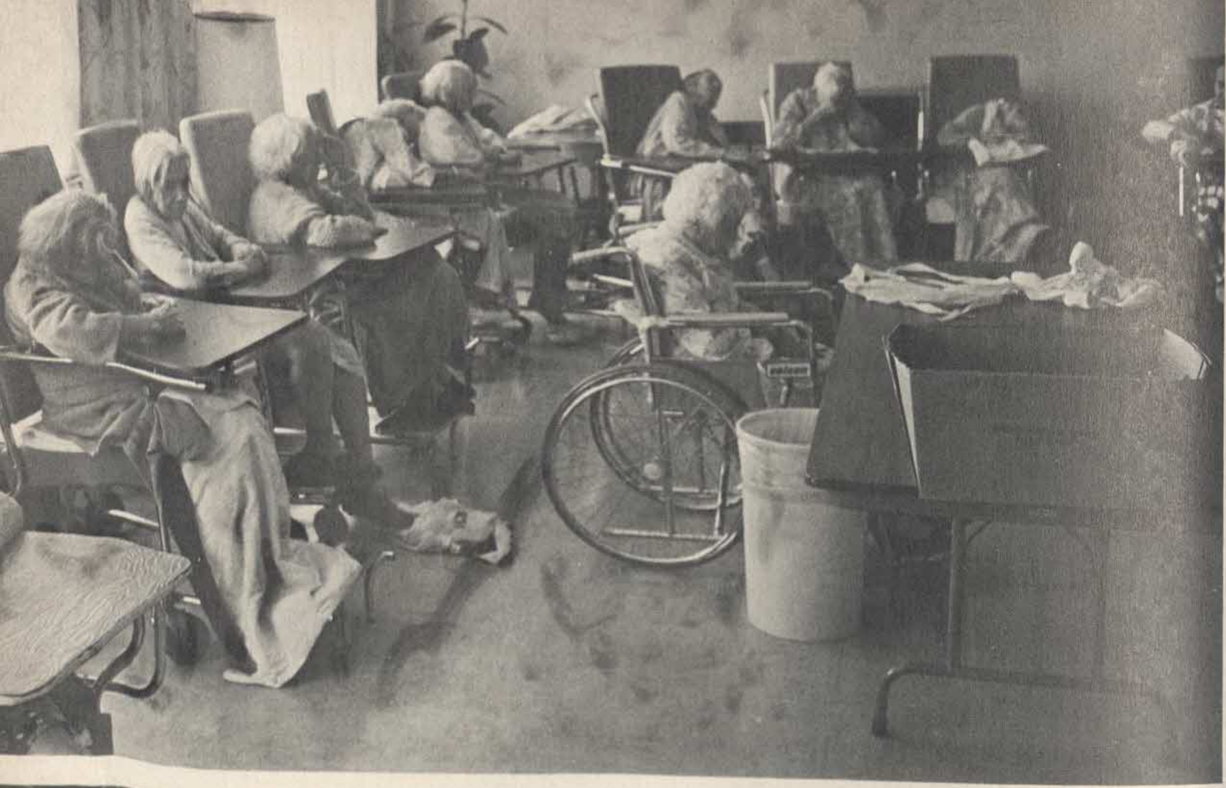


FIGURE 16–9
Conditions of life for elderly people vary remarkably in the United States today. Photos by Elizabeth Crews and Karen R. Preuss, Jeroboam, and Paul S. Conklin, Monkmeyer.

In a related study, elderly residents of age-integrated and age-segregated housing provided information about time spent with their children, family, neighbors, and friends, and their satisfaction with this aspect of their lives (Sherman, 1975). The two groups were matched on age, sex, marital status, occupation, working status, and household composition, and there was a two-year follow-up. The age-segregated residents spent more time with neighbors and friends and less time with family than did the age-integrated residents. They tended to have fewer offspring, their children lived long distances away, and many preferred to maintain independence from their children. But, importantly, there was no difference between the groups in their satisfaction with their quite different living arrangements.

It would seem, then, that a relatively active life with interpersonal relationships is optimal for most of the elderly but that some enjoy a less active existence and, furthermore, that optimal conditions vary a good deal across individuals.

THE END OF LIFE

The life span of the average individual has increased dramatically during this century. Figure 16–10 shows the projected death rates for people born in 1900 and in 1969. Overall, the death rate for those born in 1969 is less than for those born in 1900. But note also that the largest difference between the two samples is in the first years of life. The next largest is in the last years of life, but the difference is small. This indicates that *more* people are living longer today than in previous times, but that the life span itself has not changed substantially. Simply put, more of us are reaching old age, but the dream held by Ponce de León for eternal youth is still merely a dream.

A central fact of adulthood is that with each year after thirty it becomes increasingly likely that death will occur (see Figure 16–10). Not only does death become more probable between ages thirty and ninety, but the rate of increase of its probability also accelerates. The basic trend is present for whites and blacks and for males and females. Nevertheless, there are differences in the life expectancies of these different groups. A white male born in 1969 has a life expectancy of sixty-eight years; his female counterpart, seventy-five years. For nonwhites, males have a life expectancy of sixty-one years; females, sixty-eight years (Kimmel, 1974).

Causes of death can be categorized as *extrinsic* and *intrinsic* (e.g., Goldman, 1968). Extrinsic causes are the most commonly cited immediate ones; the category includes a number of specific maladies such as cancer, accidents, injuries, and malnutrition. Intrinsic causes are those involving certain general factors: cells wear out and many do not reproduce themselves; the strength of bones and the elasticity of blood vessels decreases; there is also an overall decline in resiliency; injuries take longer to heal; and illnesses are more difficult to shake off. Evidence for the importance of these intrinsic factors has led some experts to

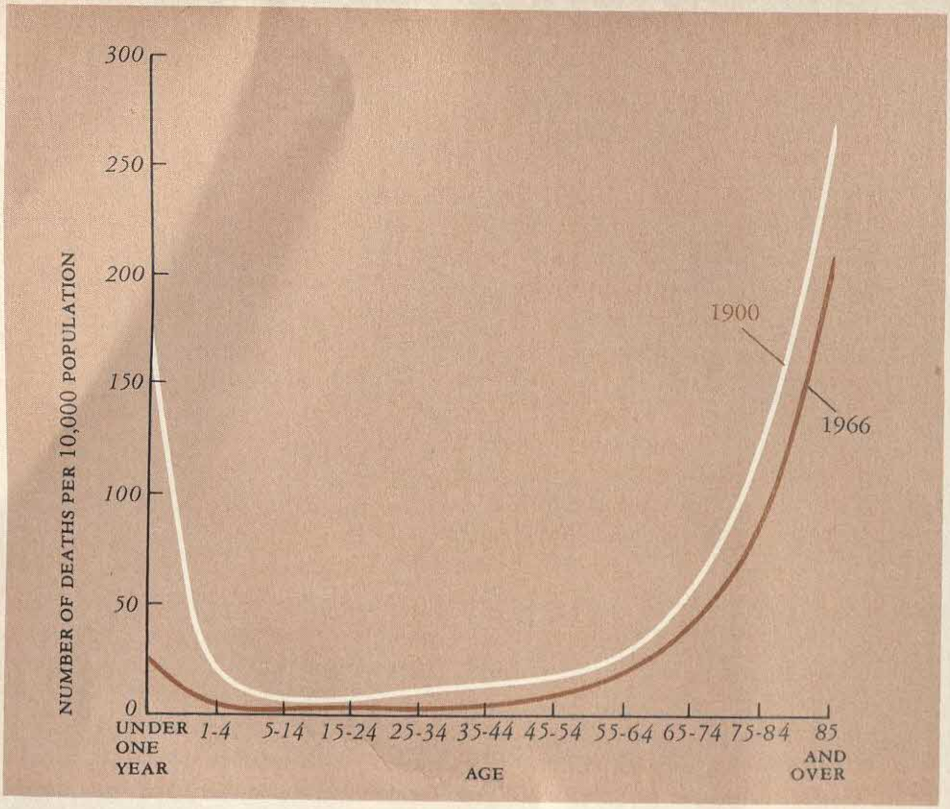


FIGURE 16–10
Death rate for people born in 1900 and in 1966, showing that increased average life span is accountable to individuals' surviving the first years of life and, to a lesser extent, to those over age 55. From R. S. Morison, Dying. *Scientific American*, September 1973.

conclude that further progress in increasing the life span may depend on finding ways to slow down the overall developmental cycle.

As a specific category, heart disease is the most frequently cited cause of death. Heart disease, cancer, strokes, vascular ailments (other than heart disease), and accidents account for approximately 80 percent of all deaths. It must be realized, however, that the more general trends listed under intrinsic causes are not cited in the present classification system.

FACING DEATH

What are reactions to one's own impending death? Kübler-Ross (1969) maintains that at least on an unconscious level death is conceived of as being killed and cannot possibly be viewed as a natural event. Based on interviews with terminally ill patients that she conducted for several years, Kübler-Ross suggests that dying consists of five stages:

1. At first the patient *denies* impending death, perhaps thinking a mistake had been made in the diagnosis. The reality of death is *isolated* psychologically, and the individual may not want to talk about the seriousness of his or her condition.

2. *Anger and resentment* sets in, however, when death as a real event is recognized. Patients may direct these reactions toward anyone avail-

able—family, friends, or medical personnel—presumably because their own demise seems unjustified in the face of others' well-being.

3. Some acceptance does occur, however, and the patient begins to *bargain,* to ask, as it were, for time-off in the procession toward death. Thus, he or she may try to take up life's tasks or to plan to live long enough to attend a special event or complete a special task.

4. The next step involves *depression,* which occurs when illness intrudes upon bargaining. Depression may be either a reactive type stemming from shame or guilt at being disfigured by illness, or a preparatory type. The latter has its basis in feelings of loss of the meaningful aspects of one's life—of loved ones, the natural beauty of the world, the cherished book.

5. Finally, though, death is *accepted* as inevitable. The patient frequently is tired, unemotional, and seemingly waiting for the last happening of life.

Kübler-Ross does not maintain that all terminally ill patients progress through all stages because some, for example, may simply continue to deny that they will soon die. She nevertheless suggests that many of the terminally ill experience the five psychological stages.

It must be recognized, however, that Kübler-Ross's terminally ill patients varied in age across the adult years; perhaps the psychological components of approaching death from the vantage point of relatively healthy old age are quite different. What is known about this process?

First of all, old people are more aware of death than are the young; that is, they report thinking about death more frequently (Jeffers and Verwoerdt, 1969; Cameron, Stewart, and Biber, 1973). But it is not clear, at least for the healthy aged, that such thoughts in any way reduce life's enjoyment or that they can be equated with *concern* about dying. In fact, an individual's attitude toward death may be a logical extension of attitudes learned early in life. Support for this suggestion is provided by a study in which a number of variables were correlated with anxiety about death (Templer, Ruff, and Franks, 1971). It was found that mothers and fathers within families tended to hold similar views, and that there was a significant correlation between the degree of fear expressed by adolescents and the degree indicated by their same-sex parent. In contrast, no significant correlation was found between age and death anxiety. The finding indicates that fear of death is as great in young as in old people and suggests that parents in some way communicate their views to their children and thereby influence them.

Reactions to death also appear to be related to the meaning that it holds for individuals. In Selection 10 Frances C. Jeffers and Adriaan Verwoerdt drawing on a major study done at Duke University, describe what death means to the elderly and the personal reactions they have to their impending death.

SELECTION 10

HOW THE OLD FACE DEATH

Frances C. Jeffers and Adriaan Verwoerdt

Doubtless the significance of death for the person has a great number of determinants, both personal and sociocultural. "The meaning of death" is not to be equated with the actual experience of the event of dying, but is taken to signify the subjective anticipations, interpretations, inferences, or projections of personal feelings onto the fact of death. It is likely that there are as many meanings of death as there are human beings capable of reflection. In spite of such an infinite variety of meanings—with their subtle differences and nuances—a certain degree of classification would seem desirable even on an arbitrary basis. Several possible categories emerge from a scrutiny of the data obtained from sentence completion tests in the Duke study (Jeffers and Verwoerdt, 1966). The elderly subjects were asked to complete the following phrases:

1. When a man dies, ——
2. Death is ——
3. I feel that when I die, I ——

It appeared that for the most part the responses could be categorized under one or another of the following headings:

Continuation or cessation of life

The greater part of the subjects expressed firm religious convictions (it must be remembered that North Carolina lies within the "Bible belt"), as for example: "When a man dies, he lives again," "Death is passing from this life into another world," or, "I feel that when I die, I think my spirit or soul will carry on." The end of life on this earth is seen by these persons as a stepping-stone to another life. Another thought expressed was that, "When a man dies, he will keep living on in the mind and hearts of those still here." There were some persons, on the other hand, who thought of death primarily as extinction of the personality and loss of identity. One "ceases to exist," "he's dead all over," "he's soon forgotten." Or, "It's very final." Thus, death was seen as "inevitable" or—more positively—as rest and release: "I will be out of all my troubles," "I'll leave behind me the troubles and worries of life."

Death as the enemy

Only infrequently was death viewed as an enemy disrupting life patterns and relationships, e.g., "Death is a cruel master." However, more subjects expressed fear of the dependency, disability, or pain which they associated with the act of dying.

Reunion or isolation

Many persons expressed reunion beliefs, as, for example, "I am going to meet the ones who have gone ahead of me." For some, death involved departure from a known existence and separation from loved ones here with sadness but without the element of decreased self-esteem: "I wouldn't be afraid to die but I dread to leave my children and loved ones."

Adapted and reprinted from F. C. Jeffers and A. Verwoerdt, How the old face death. In E. W. Busse and E. Pfeiffer, eds., *Behavior and Adaptation in Late Life.* Boston: Little, Brown and Company, 1969, pp. 163–181.

Reward or punishment

Most of the subjects viewed death as a transition to a better state of being, a reward for a life well lived: "I will go to heaven, and into the joys of the Lord." This was in keeping with the firm religious beliefs of the study panel members as a whole. Only seldom were there direct expressions that death meant punishment: "He's at rest if he lived right and he's gone if he didn't."

The anticipated or the unknown

Several subjects expressed uncertainty or curiosity, as follows: "I can't say," or, "I don't know what death is—tell me—what is it?" Or, "I wonder what it is going to be like—who knows?—sort of like going to Egypt." The anticipation of death as an event made familiar through religious rituals was observed in such responses as, "Death is going to my long home," and, "My spirit will go back to God."

In a similar manner Feifel (1965) categorized the two dominant outlooks of 40 disabled World War I veterans. One group visualized death as the dissolution of bodily life and the doorway to a new life; the other group, with a "philosophic resignation," looked on death as "the end."

EMOTIONAL REACTIONS TO DEATH AWARENESS

Typically, the older subjects studied at Duke seemed to experience feelings which were appropriate to the particular ideas about death which they had expressed; for example, it was commonly observed that beliefs in reunion after death were associated with feelings of happy expectation (Jeffers and Verwoerdt, 1966). Those few subjects who felt threatened by the sentence completion test tended to view death as being cruel or as punishment: "Those questions are very tough, I tell you, they shook me up." There was also some evidence of ambivalent feelings. Several persons stated, for example, "Heaven may be my home, but I'm not homesick yet."

Notably absent were any expressions of angry protest or rage in response to the disruptive or cruel aspects of death. The death-defying mood portrayed by poet Dylan Thomas ("Rage, rage, against the dying of the light") is perhaps more characteristic of the attitude of younger persons.

A number of investigators are in agreement that only a relatively small proportion of older persons—only 10 percent or less in several studies—express fear of death (Feifel, 1955; Jeffers, Nichols, and Eisdorfer, 1961; Swenson, 1961). In the National Institute of Mental Health sample of healthy older persons, overt fear of death was present in 30 percent of the subjects (Birren, Butler, Greenhouse, Sokoloff, and Yarrow, 1963). In a sentence completion test conducted by Kogan and Shelton (1962), 200 individuals, aged 49 to 92, thought that death was more frightening to "people in general" than to old people. They also felt that old people were comparatively less likely to regard death as one of their greatest fears but rather thought of it as an escape or as inevitable. Kogan and Wallach (1961) found, in comparing older persons with college students, that the responses to the concept of death, utilizing the semantic differential, were less negative among the older subjects than they were among the younger subjects.

In another study at Duke University, only 10 percent of the elderly community subjects answered the question "Are you afraid to die?" in the affirmative (Jeffers, Nichols, and Eisdorfer, 1961). Thirty-five percent of the subjects denied being afraid, while 55 percent were hesitant or ambivalent in their answers. The responses admitting fear of death tended to be devoid of religious references; the finding that these particular subjects showed less belief in life after death confirms that in Swenson's (1961) study. In addition, it was found at Duke that those persons who admitted fear of death gave fewer responses on the Rorschach test, had fewer leisure activities, and lower IQ scores. J. Riley (1968) reported a similar relationship between negative views of death and lower educational level in his sample of 1,500 adults. Finally, the Duke subjects who expressed fear of death had a higher incidence of feelings of rejection and depression. Rhudick and Dibner (1961) suggest that death concern may not necessarily manifest itself as overt anxiety but may be accompanied by somatizing and withdrawal tendencies.

Butler (1968) points out that even though many older persons may not show any obvious fear of death, one cannot conclude that the problem of death does not exist for them. Rather, one may need to study the person at a particular stage of his adaptation to the reality of death. As one of the elderly volunteers at Duke put it, "No, I'm not afraid to die—it seems to me to be a perfectly normal process. But you never know how you will feel when it comes to a showdown. I might get panicky."

In summary, it appears from the expressions of older persons that death is feared much less than prolonged illness, dependency, or pain, which may bring the several threats of rejection and isolation, as well as loss of social role, self-determination, and dignity as an individual. To some of the elderly ill who are cared for in their own homes, life may still seem worth living, but even here regret is often expressed for "the bother I am to those I love." Glaser and Strauss (1968) point out that terminal geriatric patients often decide to stay in the hospital in order not to be a burden to their families. Experience in nursing homes suggests that, except for an occasional geriatric patient who clings tenaciously to life, death is seen by most of them as preferable to continued illness or chronic disability. These patients may have already become "socially dead"—according to Kalish's concept—in their own eyes as well as to others, and thus they view their impending death as timely and welcome (Glaser and Strauss, 1968; Kalish, 1966). Kastenbaum (1966b) quotes staff reports in a geriatric hospital to the effect that, among older persons who were dying, most of their references to death were positively valued, such as calm waiting for death or a desire for the end of all suffering.

There has been such a wide disparity between findings on the one hand of lack of fear of death in older persons and, on the other hand, the assumption of some clinicians of the universality of this fear that Kastenbaum, in taking note of the difference in opinion, has challenged the use of this concept altogether in the study of aging (Kastenbaum, 1966a; Kastenbaum and Aisenberg, 1972).

It appears, then, that at least a good proportion of the elderly are able to talk about and deal adaptively with the idea of impending death. Many actually review their lives (Butler, 1964), and such a life review may not reflect "living in the past" so much as an attempt to integrate experience and bring it into perspective. It is perhaps through this process that individuals, in Erikson's words, come to affirm their lives as the one and only life they could have had. Perhaps this leads to acceptance of and serenity toward what is yet to come—whether one believes it will be a true afterlife or a spiritual or physical union with the universe.

SUMMARY

Adolescence is viewed as a time of transition into adulthood that often involves much stress. In our society the transition may not be well supported and is a long one. An identity crisis, labeled and described by Erikson as *identity versus role confusion*, is considered central to this period. Adolescents "try on" different commitments and roles and reevaluate themselves as a way of achieving identity.

Of the many changes occurring, physical growth and sexual development are obvious, and there is emphasis on growth and beauty. Girls advance more rapidly than boys, but there is much individual variation. Early-maturing boys appear to have some advantage over late-maturing boys. For girls, the effect of rate of maturation is less clear.

Social relationships shift dramatically during adolescence, with peers becoming more important and family less so. The struggle for autonomy is central to conflict that may occur within the family. Nevertheless, many observers point out that a large percentage of adolescents identify with their parents, accept their parents' policies, show concern for their parents, and have personal, social, and political views that are similar to those of their parents.

Coleman, on the other hand, has emphasized the evolving of a separate youth culture that has values and activities different from those of adult society. The youth culture may serve the adolescent and adults in many ways, providing the young with wider experiences, standards against which to measure themselves, general support, and the like. At the same time, Bronfenbrenner suggests that increased weakening of the family has negative effects, and he argues that the young must be reinstated into the larger society by increased opportunity for adolescents and adults to share and work together.

Drug use is widespread among adolescents, and society continues to be concerned that drugs foster crime, psychoses, dependency, addiction, and the like. Drugs are used for many reasons, and it is becoming apparent that dichotomizing youth into users and nonusers is an oversimplification. For example, Yankelovich has identified a group of nonusers who are in many ways similar to users but who have consciously rejected drugs.

Finally, vocational choice and love and marriage relationships are important in reaching adulthood. Vocational choice is influenced by many factors: society's needs, social class, parental attitudes, and sex. With regard to romantic involvements, Knox and Sporakowski provide evidence that throughout late adolescence there is a shift from "romantic" love to the more realistic "conjugal" love. Interestingly, the romantic attitude of high school seniors appeared similar to that of adults who had been married for over twenty years.

Adulthood, characterized by inevitable physical, social, and psychological change, is frequently cast into developmental stages or tasks. Erikson's psychosocial stages and Havighurst's developmental tasks are the most widely recognized, and increased interest in adulthood has resulted in ongoing empirical studies.

Biological decline begins at about thirty years of age but varies greatly with the different systems—for example, breathing capacity drops off relatively rapidly, whereas nerve conduction does not. Acute diseases decrease, but chronic ones increase. Individual variation is striking, as is the fact that the elderly are fairly optimistic about their health.

Longitudinal research indicates that intellectual functioning, once thought to drop off early in adulthood, maintains itself well into the later years of life. Intellectual change is task related, however. Performance on tests requiring perceptual-spatial reasoning declines, whereas verbal-information tasks hold up. There is also evidence that intelligence declines considerably during the years just preceding death, the so-called predeath drop.

Age norms are widely recognized and are partly responsible for adults' pacing their behavior and roles according to society's expectations. It appears that with increasing age people feel more constrained by (or "in tune" with) age norms. In any event, prestige and power rest with the middle-aged adult, and the elderly suffer a loss of social status. This loss is partly accounted for by loss of occupational role through retirement which has become almost compulsory. More men than women are affected and suffer depression; their morale is higher even when they engage in work that has small financial reward. Nevertheless, economic comfort is related to contentment, and, as a group, the elderly are not economically well off.

Related to retirement is the question of the optimal conditions for the elderly. Cumming and Henry proposed that the elderly voluntarily withdraw from the social system, being preoccupied with themselves and feeling content with this situation. While not refuting the fact of withdrawal, others argue that it is forced upon the elderly and is not optimal. This contention is generally supported, but some people (i.e., those in poor health or those who have a history of dependency and passivity) may prefer disengagement. The same individual preference is displayed toward actual living conditions, and hard-and-fast rules cannot be made.

Although more people are living longer today than previously, death in adulthood becomes increasingly probable after thirty years, due to intrinsic or extrinsic factors. According to Kübler-Ross, many terminally ill patients experience death in five stages: denial, anger, bargaining, depression, and acceptance. Relatively healthy old people tend to think more about death than do the young, but they are not necessarily concerned with or fearful of it. Their reactions reflect stable attitudes and the meaning that death holds. Death may be an enemy, a reward, a punishment, the unknown, a reunion, or an isolating event—each with concomitant emotions. But many of the elderly can discuss and deal with death adaptively, as the final stage of the life cycle.

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